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Convention

National Electric Light Association Convention

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National Electric Light Association

THIRTY-SEVENTH CONVENTION

Proceedings

General Sessions
Executive Sessions
Public Policy Session
Company Section Session

Papers Reports and Discussions

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BLANKENBURG, HON. RUDOLPH. *Address of Welcome as Mayor of Philadelphia.* 2

BLOOD, W. H., JR. *Report of Insurance Expert.* The relations with the Underwriters continue to be friendly. The Insurance Expert represents the National Electric Light Association on the Electrical Committee of the National Fire Protection Association and in this manner keeps in touch with all proposed changes in the National Electrical Code, which is generally recognized as representative of good engineering practice. Many cities have adopted the code, but a few, however, are afflicted with home-made rules which cause various kinds of trouble. The curbstone contractor and competitive lighting plants are still responsible for a certain amount of poor wiring. Both of these can be eliminated to a large degree by applying certain remedies. The National Electrical Code is revised once in two years, and the Insurance Expert welcomes suggestions as to advantageous changes in rules which contain objectionable features. Two matters which will receive careful consideration at the next conference to be held in April, 1915, are the rules on Constant Potential Pole Lines, Over 5000 Volts, and the rule as to the use of Renewable or Refillable Enclosed Fuses. Attention is called to the Hobart, Oklahoma, case, where a company having a total capitalization of $135,000 has been sued for $90,000 for alleged negligence in causing the burning of a department store. This case will be fought with energy and a decision will probably be reached this coming fall. The Insurance Expert is vitally interested in this case and holds himself in readiness to assist in all similar cases for members of the Association. 27

The attention of the Association is again called to the good work which is being done by inspection bureaus and the Insurance Expert recommends that this year pamphlets be sent out to all members of the Association, these pamphlets to be prepared under the joint supervision of one of these inspection bureaus and the Insurance Expert, and to contain an explanation of fire hazards in electric lighting plants and methods for remedying them. Recommendation is made that the incoming administration give this matter early and serious consideration.

BRUSH, CHARLES F. Address. *Anniversary Exercises.* 264

FRUEAUFF, FRANK W. *Report of Committee on Constitutional Amendments.* 187, 304, 306

GILCHRIST, JOHN F. *Report of Committee on Resolutions.* 307

INSULL, SAMUEL. *Presentation of Report of Committee on Public Policy.* Mr. Insull calls attention to the growing importance of the electrical industry in civic life. Its prosperity depends very much on the prosperity of the country, and yet, strange to say, hard times do not seem to affect it. This he attributes to the fact that none of the companies have yet developed their territories to the saturation point. In older cities, where the companies have succeeded in getting a larger proportion of available business, general industrial conditions do in a measure show some effect on the income. He voices the seriousness of any contemplated National legislation designed to limit the activities of generating companies to certain States or communities. Legislation of this type has kept back economic development and utilization of electricity in England, and if enacted in this country will seriously check the use of electricity, especially in the rural districts, which now enjoy electrical advantages only because of the activities of large holding companies in covering the country with networks over which electricity is transmitted from one State to another. Mr. Insull suggests that some missionary work be done in educating congressmen and senators on the economics of the business as a natural but regulated monopoly, so that there may be no tendency to check electrical interstate business through misdirected anti-trust legislation. 215

LÜPKE, PAUL. *Safety First.* The paper calls attention to the necessity of reiteration for the purpose of driving a matter home to those whom it is wished to reach; it appeals to the rank and file for development of the prevention spirit. It points out various causes for the lack of this spirit and emphasizes the fact that in the prevention of accidents more than in anything else the interests of employer and employed are identical. 182

MCCALL, JOSEPH B. *Address of the President.* Comment is made on the remarkable growth of the industry and of the organization, the total membership of all classes in the N. E. L. A. at present being 13,012. The Class A membership is thoroughly representative, but the great increase is in the individual Class B membership. This class includes employees of member companies, and it numbers 10,817.

For several years there has been a disposition upon the part of many to give serious consideration to a modification of the work at the national convention, confining the meeting to a few representatives from Geographical Sections, these delegates to give consideration to broad policies only. It has been contended that the important technical and commercial details can be presented and considered better at State conventions, and that more effective work would be accomplished by this method. It is important that the State organizations be maintained, not only to cement the relations between the members, but to carry on locally within their borders the educational work necessary to impress upon the minds of the public the facts in regard to the industry and the attitude toward the public of those engaged in it.

During the year the Public Policy Committee has continued its valuable work in dealing with broad questions affecting not only relations with the public, but with other public service organizations and in the settlement of property questions in different parts of the country. President McCall goes back to the first definite public position taken by the Association upon the question of public organization and control resulting from the adoption of the committee's report on the subject at the Washington Convention in 1907. "When we consider the present conditions we cannot but appreciate the foresight of this Committee in its recommendation to the National Electric Light Association in favor of properly constituted supervision and regulation in this industry."

The principle of governmental regulation through the medium of state commissions has been generally adopted throughout the country, most of the States in the Union now having commission plans, and controlling thereby the operation of all the public-service companies. In the main the activities of these commissions have led to a better understanding of the relations between the public and the utility company. Commission bodies have evidenced a general disposition to use wisely the powers entrusted to them, and in their administration to safeguard the equities of all parties concerned. It is no longer possible where such commissions exist to subject a community or a company serving it, to hasty, ill-advised action, often the outcome of political pressure.

Special mention is made of the work done by the Rate Research Committee during the year. The influence of this work cannot be overestimated and the recommendations of the committee for better standards in the forms of contracts, applications, tariff schedules, rate principles, etc., should receive careful consideration.

The leading colleges of the country have responded heartily to the work of the Educational Committee of the association, and there is every indication that the work of this committee will be productive of benefit.

Both from the economical and the humanitarian points of view the important work of the Accident Prevention Committee is sound policy. Great advancement has been made in the last few years also in welfare work among the army of electrical workers.

Special attention is directed also to the work of the Accounting Committee. The standard of accounting adopted by the Association would be effective before any tribunal having authority.

The Overhead Line Construction Committee has prepared for this convention a report and the "Standard Overhead Line Construction Handbook," containing about 900 pages.

There is need of some change in the financial plan of the organization. The income derived from members of all classes is not sufficient, and important work is not being done for this reason.

The Association has now a total of twenty-two foreign members. Eleven applications are pending, these including in England a large group of companies which have decided to affiliate in what will practically correspond to one of the Geographic Sections of the Association. 7

McCall, Joseph B. *Life of.* 321

Martin, T. C. *Report of Committee on Memorials.* 288

Martin, T. C. *Report of Committee on Progress.* The Report on Progress deals as usual with the general conditions of the industry, and presents its statistics as based on the U. S. Census figures of 1912 issued recently, with other data on development. Sections then follow taking up public questions, such as the relations and usefulness of holding companies; the public service commissions and regulation; municipal ownership. Various features of engineering work are then discussed, one or two typical new plants being described rather fully. Then come a number of sections reporting the advances in different fields, such as lamps and lighting, electric vehicles, electric heating and cooking, railway energy and industrial power, pumping and ice making, signs and slogans, and electricity on the farm. There is also a brief department covering some miscellaneous applications of central-station energy. The report concludes with details as to recent educational and welfare work.

A separate section of the Report is devoted to Hydro-Electric work and Power Transmission and appears in the Technical volume of the Proceedings. 31

Martin, T. C. *Report of Secretary.* A resumé of the miscellaneous work handled in the executive offices in New York City. Of last year's Proceedings 19,000 volumes were printed. The monthly bulletin has been increased in size. No fewer than 150,000 copies were printed and distributed during the year, and the Bulletin itself is now admitted as second-class matter by the post office authorities, resulting in a saving of $2,000 in postage. Of the general publications of the Association, 40,000 have been sold in addition to over 180,000 of special pamphlets and brochures of the Commercial Section. The "Meterman's Handbook" has reached a sale of 4150 copies, and the Association has just issued the new Handbook on Overhead Line Construction, 900 pages, and the new Salesman's Handbook in loose-leaf form, with special binder and case. The lecture bureau has proved its usefulness. There are approximately a thousand lantern slides and three motion picture films used in connection with the lectures, which were delivered eighty-one times during the year to approximately 16,000 employees. The Rate Research Bulletin has reached its fifth volume and has 583 subscribers. Other points touched on are the results of a European trip, educational conferences, accident prevention, electric vehicle co-operation and public service commission annual report forms. 17

RICE, E. W., JR. Address. *Anniversary Exercises.* 256

SCOTT, HOLTON H. *Report of Committee on Organization of the Industry.* The membership of the Association is as follows:

Class	June 2, 1914	June 3, 1913
A	1,091	1,093
B	10,817	10,256
C	73	53
D	250	242
E	785	798
	13,016	12,442

There was an error in last year's report, which showed 44 too many Class A members and 330 too many Class B members, so that in reality instead of a loss there has been this year an actual gain of 42 Class A members. Such losses as occurred in operating companies were due to consolidations and to the acquisition of holding companies. Of the 6129 towns and cities, with a population of 46,000,000, receiving service, 2691, with a population of 36,400,000, are served by 140 holding companies. 14

SEWALL, S. A. *Report on Question Box.* The *Question Box* is designed to be a clearing house of experiences. During the year it contained 254 new questions with 1296 answers made by 746 contributors. Undoubtedly most of these new questions were earnest calls for the assistance of other companies, and not only the employees of member companies but chairmen of committees and, occasionally, the "big men" in the Association, have responded with replies which gave valuable information and could be relied upon.

There has been some criticism on the use of questions which bring out references to the products of different manufacturers. Care is exercised that this necessary part of *Question Box* work shall not be abused or used to settle "grouches" or to advertise. Many questions are answered by mail directly with news notices, letters from manufacturers, advertisements and controversial matter. The *Question Box* has over 300 member companies to which advance sheets are sent, and the list is growing. 179

SPRAGUE, F. J. Address. *Anniversary Exercises.* 268

WAKEMAN, J. M. Address. *The Definite Plan of the Society for Electrical Development.* The necessary funds having been pledged, the staff for carrying out the plans has been selected and the work of the Society has been divided into sections, each in charge of a competent man.' Mr. Wakeman outlines the plans for the Society's activities and emphasizes the necessity for a more hearty support of the Society and closer co-operation with it on the part of central stations. Practically every new use for and user of electricity means additional business for the central station, and while the Society for Electrical Development is now active, it has not received the support from the central stations to which it is entitled by the importance of its work. 280

WELLS, W. F. *Report of Treasurer.* 189

WILLIAMS, ARTHUR. *Report of Committee on Public Policy.* The Committee expresses its gratification that so little conflict exists between its own views and those generally recorded by the various public-service commissions. It is stated that monopoly in public service can be justified only on the ground that some advantages accrue therefrom to the public. A fair part of the benefit resulting from such monopoly should go to the people at large. The Public Service Commission of the State of California is quoted, with apparent approval, on this subject.

All rate schedules should be given the widest publicity. Rates should never be discriminatory in their nature and should be fairly representative of the cost of rendering the various classes of service to which they pertain. Reasonable, simple public rate schedules, an efficient organization covering every feature of the company's activities, and a service of the highest standard, made available through apparatus of the latest types, are service features to which every community is justly entitled.

Under the heading of Unified Service the Committee points out the inherent advantages of generating and distributing electrical energy on a large scale to widely diversified classes and conditions of service.

Specialized training must be introduced into every department of human activity. Trained employees are needed in commercial work as well as in the technical field. The Committee suggests that wherever practical the so-called continuation schools, covering the various activities of the industry, be conducted by member companies.

The Department of Labor of the National Government reports that where organized safety and sanitation departments exist two out of three accidents are prevented. The Committee recommends that attention to this subject should be directed, first, to the elimination of all possible danger spots in plants and distributing systems and, second, to the training of employees. A member company reports that 92.3 per cent of its accidents have occurred through carelessness or negligence on the part of employees, or outside agencies. The organization of safety departments by member companies seems to be desirable.

The Committee expresses its gratification that the Legislature of New York declined this year to pass the proposed measures under which the State would develop its water powers and enter into the competitive business of supplying electrical energy to various municipalities and directly to the public.

The pending proposal that the United States Government shall purchase and operate the street-railway system of Washington, D. C., is of serious political and economic import. It is understood that this is but the first step toward the acquirement of all the public utilities of the District of Columbia. It is hardly possible for private capital to compete with the unlimited resources of the National Government, and it is to be hoped that, upon proper consideration, Congress will defeat this movement. Members are urged to get in touch with their representatives in Congress to this end. 186, 215

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Fourth	Detroit, August 31, September 1, 2, 1886
Fifth	Philadelphia, February 15, 16, 17, 1887
Sixth	Boston, August 9, 10, 11, 1887
Seventh	Pittsburgh, February 21, 22, 23, 1888
Eighth	New York, August 29, 30, 31, 1888
Ninth	Chicago, February 19, 20, 21, 1889
Tenth	Niagara Falls, August 6, 7, 8, 1889
Eleventh	Kansas City, February 11, 12, 13, 14, 1890
Twelfth	Cape May, August 19, 20, 21, 1890
Thirteenth	Providence, February 17, 18, 19, 1891
Fourteenth	Montreal, September 7, 8, 9, 10, 1891
Fifteenth	Buffalo, February 23, 24, 25, 1892
Sixteenth	St. Louis, February 28, March 1, 2, 1893.
Seventeenth	Washington, February 27, 28, March 1, 2, 1894
Eighteenth	Cleveland, February 19, 20, 21, 1895
Nineteenth	New York, May 5, 7, 9, 1896.
Twentieth	Niagara Falls, June 8, 9, 10, 1897
Twenty-first	Chicago, June 7, 8, 9, 1898
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Twenty-sixth	Chicago, May 26, 27, 28, 1903
Twenty-seventh	Boston, May 24, 25, 26, 1904
Twenty-eighth	Denver-Colorado Springs, June 6, 7, 8, 9, 10, 11, 1905
Twenty-ninth	Atlantic City, June 5, 6, 7, 8, 1906
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Thirty-first	Chicago, May 19, 20, 21, 22, 1908
Thirty-second	Atlantic City, June 1, 2, 3, 4, 1909
Thirty-third	St. Louis, May 23, 24, 25, 26, 27, 1910
Thirty-fourth	New York, May 29, 30, 31, June 1, 2, 1911
Thirty-fifth	Seattle, June 10, 11, 12, 13, 14, 1912
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General Sessions
Executive Sessions
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GENERAL SESSIONS

FIRST GENERAL SESSION—JUNE 1

1—Welcome to the City HON RUDOLPH BLANKENBURG

2—Address of PRESIDENT McCALL

3—Report of Committee on Organization of the Industry HOLTON H SCOTT

4—Report of Secretary T C MARTIN

5—Report of Insurance Expert W H BLOOD, JR

6—Report of Committee on Progress T C MARTIN

7—Report on Question Box S A SEWALL

8—Paper: "Safety First" PAUL LÜPKE

SECOND GENERAL SESSION—JUNE 3

1—Presentation of Report of Public Policy Committee

EXECUTIVE SESSION—JUNE 3

1—Presentation of Proposed Constitutional Amendments FRANK W FRUEAUFF

2—Report of Treasurer W F WELLS

3—Election of Nominating Committee

4—Appointment of Committee on Resolutions

COMPANY SECTION SESSION—JUNE 3

1—Address of Chairman E A EDKINS

PUBLIC POLICY SESSION—JUNE 3

1—Reading of Report of Public Policy Committee SAMUEL INSULL

2—Exercises Celebrating Thirtieth Anniversary of First International Electrical Conference and First International Electrical Exhibition, Philadelphia, 1884 With Short Addresses by Some of the Participants in Those Epoch Marking Events E W RICE, JR, DR CHARLES F BRUSH, FRANK J SPRAGUE

THIRD GENERAL AND SECOND EXECUTIVE SESSION—JUNE 5

1—Report of Committee on Doherty Company Section Medal and Other Prizes

2—Address: The Definite Plans of the Society for Electrical Development J M WAKEMAN

3—Report of Committee on Memorials T C MARTIN

4—Report of Committee on Constitutional Amendments F W FRUEAUFF

5—Vote on Constitutional Amendments

6—Report of Committee on Resolutions

7—Report of Nominating Committee

8—Report of Auditor

9—Report on San Francisco Convention Matters

10—Election of Officers

OPENING OF THE CONVENTION

MINUTES

FIRST GENERAL SESSION

The Thirty-seventh Convention of the National Electric Light Association was held in Philadelphia, June first, second, third, fourth and fifth, nineteen hundred and fourteen, at the Bellevue-Stratford Hotel.

TUESDAY JUNE 2ND 1914

The President, MR. JOSEPH B. MCCALL, of Philadelphia, called the meeting to order at 10:10 A. M., and said—

GENTLEMEN OF THE CONVENTION:

The presence in person of the Chief Magistrate of the City is evidence of the interest he is taking in this occasion and his appreciation of the fact that this great Association is convening in the City of Philadelphia. It is unnecessary for me ordinarily to introduce the Mayor to any audience, as before this Association was organized and since that time he has been actively advocating every movement for civic, educational and industrial advancement. I am glad he can spare the time to be with us this morning, and know he will extend a welcome in keeping with the hospitality of the City of Philadelphia; that he will fling wide the gates of the City and entrust you with the keys.

I take pleasure in introducing to you the Mayor of the City of Philadelphia, the Hon. Rudolph Blankenburg.

ADDRESS OF HON. RUDOLPH BLANKENBURG

Mr. President, Ladies and Gentlemen: With whole-hearted sincerity I welcome you, ladies and gentlemen of the National Electric Light Association to Philadelphia—the Mother City of this mighty republic. Many duties come to me as Chief Magistrate of the City. However—and I say this frankly—few give me as much pleasure in the fulfilling as this opportunity to greet you this morning, to extend the cordial welcome of our City, and to testify my hearty appreciation of the benefits to civilization, the betterment of home conditions, the expanding of manufacturing facilities and scientific developments born of the great electrical industry which you represent.

There are not many among you who can go as far back as I can into the development of light, from darkness to real light. I remember when I was a boy in the German forests, that the only light the poor people had at that time was an iron lamp, and they used sperm oil as an illuminant. It was not a very attractive form of light, it did not give much light, indeed, it was almost impossible to stay in the small rooms where they used this illuminant. Those who were a little better off used rape-seed oil or candles, but they did not give much light; and when gas was at last discovered it was a great help and a very great improvement.

Then we had coal oil, and last, but not least, electric light, which is to-day conferring a great benefit on all mankind, in making darkness give way to light.

We believe in light. We ought to have light not only in every day affairs in our homes but in the affairs of our city, and in the affairs of our State and our Nation. And that light is and should be the foundation of real good honest government. We cannot have this without it; therefore, light which spreads all over every subject should be welcomed by all of us.

You have come, ladies and gentlemen, to the most natural place for you to hold your conference, the home of Benjamin Franklin. Philadelphia is the best fitted city in which to discuss those ways and means which each of you has at heart, to promote the general welfare, and to add new momentum to the wonderful advance movement in your own particular profession.

There are other reasons for the claim that you have come to the right place, for within this city, in the year 1776, the Declaration of Independence called into existence a New Light, a beacon of light that will forever shine in all the splendor of its own merits and its own impulses. It was illuminating and it has illuminated the whole world, bringing hope and gladness into millions of lives, giving a new meaning and a new value to life itself, and kindling into new power in millions of hearts the great doctrine of the Brotherhood of Man.

Light is a great civilizer and a new ameliorator. In our present day executive work, we recognize light as the most potent aid of the police force in its war against crime. Light adds to the power of happiness, begetting in mankind through its illumination. cleaner, saner and more sunshiny thought. And combined with other agents of advanced civilization and experiment and study, it is making life better, brighter and more lovable here and everywhere.

We Philadelphians are proud of our City, and we have many reasons for being so, as the new book published by your Society will show you. We cannot speak, and the book does not make mention of everything in current news that makes Philadelphia one of the foremost cities of the world. But among other things let me call to your attention, and invite your consideration of a subject not mentioned in the vade mecum, and let me suggest that you visit what I regard as one of the most characteristic features of our life here. You ought to go, the ladies as well as the gentlemen, into the courtyard of our great twenty-five million dollar municipal building. You see I cannot help bragging about our twenty-five million dollar municipal building (laughter) although I must say that it cost rather more than it should have cost (laughter). It is the largest building devoted exclusively to municipal administration in the world. You will notice there in the courtyard of that building a modest little structure. in fact a tiny baby building, nestling as it were in the giant arms of our great municipal building. This little building is given over to our Baby Saving Exhibition; and there is going forth from that exhibition a light that is making for the uplift of the whole Nation. The proof of the beneficence of the work conducted in that little building lies in the fact that sixty-six per cent of the reduction in the death rate was among children under five years of age, and forty-four per cent among children under one year of age. That decrease in the death rate, that result, is due solely to the safeguarding of the lives of little children, and the instruction of mothers in the care of children. (Applause.) It will be well worth your while to go there if you spend but five or ten minutes in the building, and take home with you the story of what Philadelphia is doing to save the lives of our babies and our children—the little ones that make our homes happy by their presence—and if they are taken away we are sad, very sad, so sad that we almost wish we were not living.

We who have suffered know whereof we speak. Go and see what you can there in Philadelphia, and take away with you the spirit and the impulse we have to save the children of to-day who will become the men and women of to-morrow; and you will find many of the men and women in your own towns who will be glad to do what we are doing in Philadelphia when their attention is called to it. Here, within the walls of this small structure, object lessons are brought to our people, illustrating the way to care for the lives of the tender little children received direct from the giver of all life and light. Each day a portion of the busy throng which hurries through this place, is seen to separate from its fellows to see what there is in the building, and it is certain to reach even the hardest heart, certain to appeal to even the least educated in the community. I would like each of you to carry away from Philadelphia a memory of this little building resting safely at the foot of the tower five hundred and fifty feet high, crowned by the statue of William Penn, for it is eloquent of our determination to do all in our power to have all those who are to fill our homes in days to come, physically equipped to meet the battle of life, mentally equipped and morally trained to make these homes, homes in fact as well as in name.

When I address audiences from a distance, I can never refrain from calling attention to one of the most important phases of our public life, that is, that we should in public life, in city administration, do what you, Mr. President, are doing in your position, what you gentlemen are advocating wherever you go, absolutely eliminate politics from municipal offices and from the administration of municipal affairs. (Applause.) Where would your great organization be if you were guided by political considerations? Instead of occupying the position to-day that is second to none, all over the world, with an investment representing I do not know how many billions of dollars, where would you be if, instead of following business lines, you let politics run your affairs? And so in our city and so in every city. This elimination of politics from the city administration should be the object of every citizen.

I hope I shall not be charged with defaming Philadelphia, when I state that up to within three years ago, everything in the administration of the public affairs in Philadelphia in the City Hall was dependent upon politics. Since I have been Mayor of Philadelphia, politics have been eliminated from the City Hall. (Loud applause.) Our policemen and firemen to-day are free American citizens, where previously they were organization slaves. Are such things existent in your cities all over this broad land? In San Francisco, in Portland, in New Orleans, wherever you go? No, no. Make up your minds that the City administration can never result in any good at all until you eliminate politics and establish a business administration in everything connected with your different cities.

We can learn a great deal from foreign citizens; city administration in England, and in Germany, especially, is far ahead of ours. We could go there and learn, but it is not necessary, for we know from what we read in the newspapers of the statements made by some of our citizens who have been to these foreign cities, how far ahead of us these cities are.

We, who claim to be the most enlightened people in the world, we, who have a citizenship of which every man can be and should be proud, are dead failures in many instances when it comes to the administration of municipal affairs.

I beg of you, I beseech you, gentlemen, take this word from an old man, who has almost run his career, and who will die with a smile on his lips because he has never deviated one iota from the principles that ought to go with good citizenship everywhere. (Loud applause.)

I cannot help it, I almost wax eloquent when I speak of these matters. They are very near and dear to my heart. I did not come to make a speech, but I fear I have almost done so (laughter). Let me again assure you of my hearty welcome, and of my keen appreciation that your visit will do our citizens great good in quickening interest in a great movement for the betterment of mankind through the utilization of natural forces.

I wish you success in your deliberations, and a safe return after these deliberations are concluded, to the homes whence you came, and to the vocations you honor through your active participation therein.

A hearty welcome, thrice welcome, ladies and gentlemen, to Philadelphia. I hand you the keys of the City, and I hope you will take home with you pleasant memories of the city of William Penn, the city we love to call The City of Brotherly Love. (Loud and continuous applause.)

PRESIDENT McCALL: His Honor tells me he is compelled to keep an engagement, but feels very thankful for the kindly reception which you have given him.

MR. SAMUEL INSULL, Chicago: I move you, Mr. President, that the Convention pass a vote of thanks to the Mayor of this City for his very kindly greetings extended to us this morning. (Seconded.)

PRESIDENT McCALL: The motion is in order. All in favor will please rise.

(Motion was unanimously carried by a rising vote, amid loud applause.)

VICE-PRESIDENT HOLTON H. SCOTT: The next number on the program will be the President's address.

ADDRESS OF PRESIDENT McCALL

The last Convention held in the City of Philadelphia convened in the Assembly Room of The Union League in February, 1887, twenty-seven years ago.

The men assembled at that meeting, as is the case in this gathering, represented the most forceful and dominant characters in an industry which has taken a commanding place, if not the first place, as an agent of usefulness in the advancement of civilization.

The selection of Philadelphia, the scene of Benjamin Franklin's most noteworthy achievements, as the Convention City, was particularly felicitous this year, when we are celebrating the Thirtieth Anniversary of the First International Electrical Congress and of the First International Electrical Exposition, both held here under the auspices of the Franklin Institute.

At that time according to the records our membership consisted of 159 central station and manufacturing companies only, and the total number of representatives present was 53. The total membership of all classes at this date is 13,012. While, of course, the Class A membership, representing our operating companies, has increased by the addition of nearly all the companies which have come into existence, the great increase has come in the individual Class B membership, embracing all employees of member companies who desire to affiliate themselves with the Association and thereby obtain educational benefit from the publications of the Association, as well as from contact with individuals in the committee and other work carried on in manifold ways. That the average employee is alive to the importance of this connection is evidenced by the fact that the number of individual members has grown in four years to 10,817.

The great growth of membership in Commercial and Company Sections demanded a broadening out of the executive organization of the Association, and following the recommendations of the last two preceding administrations, the Convention of 1913 amended the By-Laws to provide for two additional vice-presidents to assist the executive management. The result of this change in the past year has been very beneficial; and the demands upon the time of the President and Secretary have been lessened by the great willingness on the part of the newly elected Vice-Presidents at all times to attend meetings of Company and State Sections of kindred organizations whenever requested. We desire especially to record our thanks for and appreciation of this work.

There has been for several years a disposition on the part of many to give serious consideration to a modification of the work at the National Convention; to confine its gatherings to a few representatives from the Geographical Sections, who would give consideration only to the broad policies of the industry, it being contended that the important technical and commercial details could be better presented and considered at State Conventions and more effective work accomplished thereby. Much might be said in favor of this change in policy, and a change would, no doubt, be welcomed by those whose duty it is and has been to prepare for the holding of the large National Convention, the scope of which is not restricted, and which speaks with authority upon matters which must of necessity be standards for the guidance of all having to do with the industry. It is important that State organizations be maintained, not only to cement the relations between the members, but to carry on locally within their borders the educational work necessary to impress upon the minds of the public the facts in regard to the industry and the attitude towards the public of those engaged in it.

The great number of live, current topics and questions which have to be treated at such conventions, and the introduction of, or an elaboration of, all the new issues which have been advanced and advocated in late years, has somewhat cumbered the machinery of the convention and to a great extent prevented that invigorating and helpful discussion so necessary to hammer out the facts and their application. This has been to some degree unavoidable and will be difficult at all times to fully overcome. We have attempted in the preparation for this Convention, to limit the number of papers presented, in the hope and expectation that more time will be given to their discussion and consideration, and we trust the members will take advantage of the opportunity. In so far as possible the papers have been distributed, and the leaders of discussion are prepared.

The Public Policy Committee has held a number of meetings during the year, and has continued its valuable work of dealing with broad questions affecting relations not only with the public but with other public service organizations. Joint meetings have been held with these, looking to co-operative efforts toward unifying and harmonizing conditions affecting public relations, and in the preparation of literature and reports on basic principles of public service common to all. The Committee's good offices have also been availed of in the settlement of property questions in different parts of the country, with most excellent results.

In reviewing the splendid work of this Committee, our minds turn to the first definite public position taken by the Association upon the question of Public Regulation and Control, by the adoption of this Committee's Report on the subject at the Thirtieth Convention, held in Washington in 1907; and when we consider the present conditions, we cannot but appreciate the foresight of the Committee in its recommendation to the National Electric Light Association in favor of properly constituted general supervision and regulation of our industry.

The principle of Government Regulation through the medium of State Commissions has been generally adopted throughout the country, most of the states in the Union now having Commission plans, and controlling thereby the operation of all public service companies. In the main, the activities of these Commissions have led to a better understanding of the relations between the public and the utility company; the presentation to the various Commissions of accurate information in regard to properties, rates, service, equipment, and all the conditions surrounding the operation of utility companies, and what they are required to do to serve the public, has removed and corrected much of the misunderstanding regarding them which existed in many quarters, and fully awakened managers of properties to a sense of their responsibility to the public. The action of Commission bodies has evidenced a general disposition to use wisely the powers entrusted to them, and in their administration to safeguard the equities of all parties concerned. It is no longer possible where such Commissions exist, to subject a community or a company serving it to hasty, ill-advised action, often the outcome of political pressure or an apparent local sentiment incited for selfish reasons under the guise of "competition," and to the added burdens of investment in duplicating operating systems, with the logical result, a new combination with a maintaining of rates until such investments shall have been digested.

Especial mention is made of the work done by the Rate Research Committee during the past year. The influence of this work cannot be overestimated, and the recommendations of the Committee for better standards in the forms of contracts, applications, tariff schedules, rate principles, etc, should receive most careful consideration. The preparation and editing of the Rate Research Bulletin have been done in Chicago and through the courtesy of the Commonwealth-Edison Company.

The experience of the Educational Committee has proved that the large institutions of learning are deeply interested in the work of organizations such as ours. The leading colleges of the country responded heartily to the Chairman's invitation to have representatives serve upon the Committee, and are cooperating with us in our desire to secure and maintain better relations with the educational institutions of the country. There is every indication that this work will be productive of benefit, both in bringing the professor and the student into direct relations with the central station and enabling the central station president or manager to present before the classes in college a sane view of the economic conditions that control the problems under which our industry has to be carried forward.

The Accident Prevention Committee has started a "Safety First" campaign, and has been active in the preparation and distribution of literature containing recommendations and instructions for the purpose of removing all possible elements of danger in operating systems, and educating employees to the necessity for exercising care to prevent injury to themselves or their coworkers. From the economic as well as the humanitarian point of view, it is sound policy for any company to adopt accident prevention methods.

Probably no line of activity in the Association has shown greater advancement during the last few years than that of the welfare work among the great army of electrical workers. Many hundreds of thousands of men and women in the electrical industries have been benefited by the community of interest that has been established between the financial and directing forces and those who occupy positions in various capacities of a subordinate nature.

The organization of beneficial associations, maintained in part by employer and employee, has had most satisfactory results. These organizations, fostered by the companies, but controlled by trustees elected by the employees, have been of inestimable value.

Service annuity departments have been created which provide a liberal plan of paying annuities to employees who have given long and faithful service and who by reason of advanced age or of disability are unable to perform efficient work. Payments are contributed entirely by the company, and the plan is based upon voluntary or recommended retirement at the age of 65 years for men, and 60 years for women. Locally, we have had most satisfactory results from these institutions.

I hope, throughout the entire industry, wherever it is possible for any company or group of companies to adopt plans of this kind, that they will put them into effect as soon as possible. I know of no greater agent for the production of efficient work than such organizations designed for that kind of work.

We call especial attention to the consideration of the work of the Accounting Committee, and the importance of adopting its recommendations, if not in full, at least to the point of enabling us to present to the public at large a system of accounting covering all phases which can be regarded as a standard for the industry, and which represents in its basic principles the best thought of those whose experience has given them superior knowledge. A standard adopted by the National Electric Light Association would be effective before any tribunal having authority.

The Commercial Section through its Handbook Committee has issued the first instalment of the new "Electrical Salesman's Handbook," and has prepared a large amount of additional matter for publication.

The Overhead Line Construction Committee has prepared for submission at this Convention its report on a Standard Overhead Line Construction Handbook containing about 900 pages. This has been carefully prepared, and consideration given to all the details of such construction. It covers conditions in every section of the country, and as there is a great demand at this time for the report and a real necessity for establishing such a standard it is hoped the Convention will approve of the publication and distribution of the handbook.

I might call attention to the fact that this subject will be considered on Wednesday morning at the Technical Session, and it is most important that those who are interested and informed on the question of overhead construction and the joint use of poles should be present at the meeting, for a full discussion of the subject which is one of the big issues of to-day.

The Executive Officers, who are familiar with the magnitude of the work which these committees have done in the preparation of the material for the handbooks and appreciate the fact that the results will undoubtedly prove very valuable to the entire membership, desire to express the thanks of the Association to each member of these committees.

Time will not permit me to mention in detail the other committees, the members of which have given their time and best thought unselfishly and with deep loyalty to the organization and to the important detail work in the different branches of the industry, which, after all, is the groundwork for all the results obtained.

The report of the Secretary will show the extent of the distribution of the literature of the Rate Research Committee and the prospective needs of the Safety Committee. The amount of work involved in both of these departments emphasizes the necessity for centralizing this work at the headquarters of the Association; and while it is expected that the revenue derived from these sources will offset the expenses, it will take time to put them upon a basis where they can be self-supporting.

The lessons gained from the year, however, impress us with the importance of some change in the financial plan of the organization, if practical work is to be done in meeting all the questions which have kept pace with our growth, and in some respects are far ahead of our power to estimate. The income derived from members of all classes is not sufficient. Important work is not being done for this reason, and in many things individual companies are bearing the whole expense rather than have the industry suffer. This is not equitable.

Those most vitally interested should devise a plan of revenue which will warrant the most liberal treatment of the employee members, Class B, while at the same time permitting them an independent interest by contributing to the work of the Association through the medium of a membership fee.

While, as has been suggested in the past, an endowment fund would be desirable, the support of this work should be an annual charge against the industry. There should be a re-rating of the dues of Classes A and D. These two classes reap the greatest benefit of the work, and we must look to them for the support of this great Association, whose influence has grown far beyond that of a mere technical and commercial body. This subject will be treated more in detail in the report of the Executive Committee, and we trust that recommendations made by it will be adopted.

SECRETARY MARTIN: It is customary to appoint a committee to consider and report upon the President's Address at the last Executive Session, on Friday morning.

PRESIDENT McCALL: The Chair will appoint Mr. Edgar, Mr. Gilchrist and Mr. Tait as members of this committee.

Next on our program is the Report of the Committee on Organization of the Industry, of which Committee Mr. Holton H. Scott, of New York City, is Chairman.

REPORT OF COMMITTEE ON THE ORGANIZATION OF THE INDUSTRY

Your Committee reports the membership as of this date, also as of June 3, 1913, as follows:

	June 2, 1914	June 3, 1913	Difference
Class A	1,091	1,093	loss 2
B	10,817	10,256	gain 561
C	73	53	" 20
D	250	242	" 8
E	785	798	loss 13
	13,016	12,442	gain 574

Although we actually received 92 Class A applications, the total of A members is 2 less than at the time of the last report. We have only recently learned, however, that our previous report was in error. A very careful audit was made of the membership and it was found that we were reporting 44 too many Class A members and 330 too many Class B members. The actual result, therefore, instead of being a loss, is, in reality, a gain of 42 members.

An analysis was made of the Class A resignations and it was found that fully one-half were caused by consolidations and acquisitions by holding companies. It is our opinion that some of the holding companies are violating the Constitution when they drop the membership of subsidiary companies.

The latest information gives the total number of towns and cities supplied by central station service in the United States as 6129, serving a total population of approximately 46,000,000 people. One hundred and forty holding companies serve 2691 of these towns and cities with a population of 36,400,000.

It is not to be presumed that all of the towns and cities supplied by holding companies had incorporated central station companies, but we think we are conservative in saying that the total number of such companies is greatly in excess of the present number of Class A members. Of the 6000 central station companies listed in the McGraw Directory there are less than 200 in towns of 5000 or more that are not Class A members or are subsidiary companies of holding companies that are members. We present these facts to show that the growth of Class A membership will necessarily be rather slow in the future. One important feature during the past year has been the acquisition of 13 foreign Class A members, which resulted largely from the efforts of Secretary Martin.

Class B membership shows a fair increase, but nothing like what your Committee had hoped to report. The total Class B membership in Company Sections is several hundred less than a year ago and, therefore, the increase in B membership means a very general distribution.

Although vigorous efforts were made to increase the Company Sections, we have not been very successful. We desire to repeat our statement of last year that future growth must come largely from the development of the Company Section movement.

The Geographic Sections have not been increased and really no effort has been made to increase the number for the reason that the formation of these sections has almost always been a financial loss to the parent body.

We append reports showing the membership of the 43 Company Sections, also of the various Geographic Sections.

In conclusion, your Committee desires to express its appreciation of the help and co-operation of the Secretary and his staff.

Respectfully submitted,

HOLTON H SCOTT, *Chairman*
BEN C ADAMS
GEORGE ALLISON
HAROLD ALMERT
P A BERTRAND
N H BOYNTON
DOUGLASS BURNETT
O A BURSIEL
E C DEAL
C N DUFFY
L FITZGERALD
B H GARDNER
E S HAMBLEN
R W HEMPHILL, JR
E H HOUGHTON
G W HUBLEY
A H JONES
PETER JUNKERSFELD
S M KENNEDY
T E KENNEY
E KIFER
J H LARMOUTH
D H MCDOUGALL
J C MCQUISTON
B S MANUEL
H I MARKHAM
B W MENDENHALL
H M PARSONS
T W PETERS
VAN D RICKERT
W L SOUTHWELL
C E WHITE

MEMBERSHIP OF THE GEOGRAPHIC SECTIONS

NEW ENGLAND SECTION

	A	B	D	E
Maine	9	16	0	0
New Hampshire.	14	15	0	0
Vermont	14	30	0	0
Massachusetts ..	50	350	27	47
Rhode Island....	6	69	8	7
Connecticut	22	58	10	11
Total	115	538	45	65

CANADIAN SECTION

A	B	D	E
59	222	10	48

NEBRASKA SECTION

A	B	D	E
29	27	0	0

MISSISSIPPI SECTION

A	B	D	E
14	19	0	0

MICHIGAN SECTION

A	B	D	E
46	202	5	1

IOWA SECTION

A	B	D	E
56	40	0	1

EASTERN N Y SECTION

A	B	D	E
86	450	68	305

PENNSYLVANIA SECTION

A	B	D	E
77	935	23	138

SOUTHEASTERN SECTION

	A	B	D	E
Georgia	14	53	2	1
North Carolina..	12	17	0	0
South Carolina..	6	0	0	0
Total	32	70	2	1

NORTHWEST SECTION

	A	B	D	E
Washington	31	34	6	0
Oregon	17	48	0	0
North Dakota...	8	4	0	0
South Dakota...	9	5	0	0
Nevada	4	8	0	0
Total	69	99	6	0

SUMMARY

A	B	D	E	
115	538	45	65	
59	222	10	48	
29	27	0	0	
14	19	0	0	
46	202	5	1	
56	40	0	1	
86	450	68	305	583
77	935	23	138	2602
32	70	2	1	159
69	99	6	0	559
583	2602	159	559	3903

PRESIDENT MCCALL: Gentlemen, the Report is before you, and a motion is in order to accept it. (Moved and seconded.) It is moved and seconded that the Report of the Committee on the Organization of the Industry be accepted. (Motion carried.)

We will now have the Report of the Secretary, Mr. Martin.

REPORT OF THE SECRETARY

The reports of the Treasurer of the Association and of the Chairman of the Committee on Organization of the Industry furnish quite fully all figures with regard to the finances of the Association and the numerical status of its membership. It will suffice here simply to mention that the total receipts from all sources of the body are now in excess of $122,000, with expenses of all kinds of $118,000, while the total membership has reached within the past month 13,016 of which 1093 are Class A operating companies. All these figures are in excess of those of previous years.

Miscellaneous Work

The volume of correspondence handled in the office by the staff included 80,000 pieces of first-class mail, not inclusive of 20,000 bills for dues and 7000 bills for publications and items of that character. There were also sent out 60,000 copies of various circulars. The large sets of rate information forms filed by several hundred member companies have been loaned to various company and individual members from time to time, no fewer than 154 such requests being received; and there were also 150 requests for the similar sets of accounting forms, which constitute part of the Library of the Accounting Committee. Such volumes are very frequently inspected in the office, and many telephonic and telegraphic requests also come to hand for the rate data, showing its value. There is also a constant influx of inquiries from member companies for specific information with regard to almost every detail of central station practice, and a great deal of work is done and time is spent in getting this material together by correspondence, which after its specific use by the inquiring member is generally placed on file in the archives of the office for later reference, when other inquiries of the same kind may come in.

Proceedings

The more recent method of dividing up the proceedings into parts, each relating to some specific department of the work done at the conventions has been maintained with a further saving in expense, as in 1912, although 19,000 volumes have been printed and distributed of the 36th Convention, 1913. A useful piece of work done during the year has been the preparation and issuance of an Index to the Proceedings of the last five conventions, 1909 to 1913 inclusive. It is an interesting and significant revelation of the extent to which the work of the Association has grown, that this latest Index for only five years has nearly 300 pages, or is about as large as the one previously issued for the entire proceedings of twenty-five years, although both have been compiled on the same plan. It is the present intention to issue such indexes for each five-year period. A copy is sent free to each member company or Company Section library, and the limited number of copies remaining are placed on sale. The Proceedings were issued with wonted promptitude well before the end of the year; but there still remains the gap of some months between the occurrence of the convention and the publication of the minutes, which is more or less unavoidable under the present plan. In this respect the Association compares favorably with other bodies, some of whose proceedings are over a year old when delivered in bound volumes. Copies of the papers and reports can usually be secured however at any time, if wanted, from the reserve stock of advance papers printed for convention use. One plan suggested has been to abolish the present method entirely and issue the papers, reports and discussions as part of the monthly Bulletin, but no action has been taken on this scheme, which would involve many radical changes.

Bulletin

The Bulletin has been improved in many respects during the year, being increased in size and quantity of contents, while one or two minor new features have been introduced, special attention being paid to articles and reports of matters more particularly connected with municipal ownership and Public Service Commissions. A special effort has been made to build up the Question Box to which now from 40 to 48 pages are regularly devoted monthly; and its editor, the Assistant Secretary, is in touch with a corps of some 300 voluntary correspondents, to whom questions can be referred and whose help has been invaluable. A special form of inquiry blank has also been prepared for general distribution to facilitate the sending-in of questions by busy men with little leisure for correspondence. No fewer than

150,000 copies of the Bulletin were printed and distributed. A very important step was gained by securing the post office privilege for the entry of the Bulletin as second-class matter. Efforts have been made in this direction for several years past, but the character of the Bulletin as a magazine justified the latest effort, now crowned with success. The Association will make a saving of not less than $2,000 on Bulletin postage this year and part of this has been put back into the publication.

General Publications

During the past year no fewer than 40,000 Association publications of various kinds have been sold in addition to over 180,000 of special pamphlets and brochures of the Commercial Section. The tendency of the Association to take up the duties of a publishing house has become somewhat more marked and it may at no distant date be necessary to consider seriously how far this policy shall be carried. Such work is just like that of an ordinary publishing concern and involves a great deal of time in bookkeeping and billing and in miscellaneous correspondence, while there are many other things on which perhaps the Association might more advantageously concentrate its energies and its forces. On the other hand the Association enjoys thus the public spirited services of many members and committees whose productions have a very distinct value and who put together information and data that can hardly be obtained in any other form. Among such publications may be noted for example, the Meterman's Handbook of which 4150 copies have already been sold; the new Handbook on Overhead Line Construction, a splendid compilation of about 900 pages and the new Salesman's Handbook in loose-leaf form, with special binder and case. It is needless to add that the issuance of such publications involves an outlay of several thousand dollars, by which the working funds of the Association are tied up to a considerable extent and over a long period until the editions are exhausted.

Commercial Section Office

As is well known the clerical work connected with the Commercial Section has been carried on in the office of the Secretary for sometime past, needing practically the entire attention of two members of the staff with incidental help from several others from time to time. A great deal of this work is necessarily connected with the sale of the Section publications which have been very vigorously pushed and are in constant demand, with many requests received for sample copies. The Bulletin carries two or three pages of Commercial Section news each month, furnished by a special editor, devoted to the propaganda of the Section, annd advertises the Commercial Section literature in every issue.

Lecture Bureau

During the past winter season the Lecture Bureau of the Association, instituted 1913-1914, has again proved its great usefulness, and the lectures which are furnished free to Company Sections, have been in constant demand. During the season this work takes practically nearly all the time of two persons in corresponding and circulating the lectures and sets that embrace nearly 1000 lantern slides. The lectures were delivered no fewer than 81 times and were heard by not less than 16,000 employees, a fact which in itself is a good measure of the educational work thus attempted. An effort has been made to use these lectures as a means of bringing more company sections into existence, but a plan has also been introduced of permitting the companies without sections to enjoy their use on the payment of a small fee. A further interesting step has been taken in the use of these lectures by educational institutions which have made request for them for the benefit of their electrical students. This is quite a novel feature, and so far as is known the Association is the only body of the kind furnishing such material; but it is felt that there are possibilities of useful development in this direction, especially as part of the closer relationship which it is hoped to encourage between the Association and the various seats of learning throughout the country.

Company Section Work

It is felt that while the Company Section activities are maintained most successfully at almost every point where a Section has been established, the number of new sections is not as great as it might be. Systematic efforts have been made however in this direction, both by the Committee on the Organization of the Industry and the Secretary's office. Mr. Holton H. Scott, Chairman of this Committee, created considerable interest by the offer of three cash prizes of $25, $15 and $10 for the three best sets of ten reasons for joining a Company Section, and as many as fifty-one competing sets were received, which were passed upon by a committee. A great deal of this matter has been printed in the Bulletin, and has been quite beneficial in directing attention to Company Section work amongst both the companies and their employees.

Rate Research

One of the incidental but notable Association publications is Rate Research, devoted as the members know, chiefly to a record of new rate schedules and abstracts of Commission and Court decisions or other features of public service regulation. This publication has now reached its fifth volume and is issued weekly in 16-page form. Its financial statement shows receipts up to date from October, 1912, of not less than $8,458, with expenses of $6,321, or a credit balance of over $2,000, which the Chairman of the Committee believes would be much better if an official audit were made. The general appreciation of this work by those interested in these important subjects is shown by the fact that there are 583 subscribers to it. It is interesting to note however that this Bulletin is published outside Association headquarters and is issued in Chicago, so that virtually a separate office is maintained there for the purpose. This comment is equally true with regard to the new Accident Prevention Committee, which has been doing such excellent work, but has its own headquarters with a small paid staff in Chicago. It should be regarded as a question of broad policy how far the Association wishes to go in this diffusion of its energies or whether it is perhaps not better to aim for concentration of the work where other similar work of the kind is being done by the Association's own staff.

European Trip

At the end of 1913 the Secretary took a trip of six weeks to Europe, being his first vacation since entering the service of the Association in 1909. Part of this time was devoted to a brief canvass of the central station situation in Europe, and six countries were visited hurriedly. Owing to the fact that many inquiries have been received from abroad for Association literature or as to its membership, it was thought various companies might wish to avail themselves of the foreign membership benefits, with dues fixed at $20 in the Constitution of 1913. It was found that several companies were interested in the idea and some of them have since come into membership, while negotiations are in progress at this moment with a very important group of companies which would virtually constitute a Section. The interest in Association work in far distant countries may be gauged by the fact that while in London the Secretary secured the membership also of the central station companies in Melbourne and Adelaide, leading cities of Australia.

Educational Conference

A new departure in Association activities was taken on April 20th when a conference was held at headquarters in New York at the call of the Chairman of the Committee on Relations with Educational Institutions, and from this conference it seems likely that results of great value to the seats of learning and the central station companies may ensue. The membership of the committee has an honorary branch, a regular committee and a group representing the colleges, or a total of twenty-three in all with the chairman. The reciprocal relations that should exist in larger degree and in closer intimacy between the industry and the college were brought out very clearly in the conference. On one hand a desire was expressed that easier openings and better opportunities should be afforded in the central station field to the technical graduates from electrical engineering classes, most of whom have hitherto found a warmer welcome from the manufacturing side of the art. It was suggested for example, that a bureau might be created which would act as a clearing house for summer work for students. On the other hand, the belief was strongly expressed that great good could be accomplished if the leaders in the central station industry and the Association would appear more frequently before the student classes and acquaint them with the various economic, financial, industrial and social conditions generally involved in the expansion of the central station now going on so rapidly, and which with its universalized plan of electrical energy supply is affecting every class in the community. Hence, no matter what work a student may take up in later life he will carry with him a just appreciation of central station aims and ideals in serving the public. In connection with this class of work it must be noted here also that the Commercial Section has attacked the subject from a different angle and has had a working committee on the education of central station salesmen, its report being presented also at this convention.

Accident Prevention

This year the Accident Prevention Committee will make its first annual report, which will undoubtedly prove of great interest and importance to the entire membership. Attention has already been called to features of its work in the monthly Bulletin, while the Committee has in the meantime issued a brief and pithy pamphlet on Safety First and has had under consideration and preparation, rules for safety work. The Committee is making at this convention the first safety exhibit the Association has ever had, in a small and select display of photographs, safety data and various appliances. It has also prepared a Safety film to be shown here for the first time.

Electric Vehicle Co-operation

One of the interesting events of the year has been the co-operation with the Electric Vehicle Association of America by means of a joint committee in the endeavor to secure a larger use of electric vehicles by the United States Post Office department, especially in the parcel post services. Each Association has undertaken its own part of the campaign, both of them using a carefully prepared pamphlet setting forth the advantages of the electric vehicle and its gratifying record in doing just the kind of work this involves. The N. E. L. A. Committee circularized all its operating and manufacturing members, suggesting that they call the attention of the congressmen and senators from their respective districts to this subject; and suggesting also that they invite various users of electric vehicles in their territory to address similar letters, stating their success in using electric trucks or delivery wagons. It was also suggested that the local postmaster, if not already using such vehicles, be made acquainted with their capacity and possibilities. It is hoped and believed that useful results will redound from this campaign, which at least will have had the direct good of calling special attention to the electric vehicle at this stage of its renascence and present rapid development.

Two New Books

Reference has already been made to two new books now published by the Association and issued for the first time here at the convention. In this connection it is certainly most interesting to note the fact that each of them has been prepared under the direct and active editorship of a member of the staff of the Philadelphia Electric Company, in whose city the convention is now being held and whose interest in Association work is thus most strikingly evinced. The Overhead Line Construction Handbook consists of 800 pages of text, exclusive of the index, introductory pages, etc., and also contains 430 half tones and line cuts. There are no fewer than eleven sections, embracing the entire range of overhead line construction work in its technical details and inclusive of a great deal of material not otherwise obtainable. This handbook has been bound in limp leather and gilt edges. It is hoped to issue it at a price not to exceed three dollars ($3.00) a copy.

During the year the Commercial Section Committee on Electrical Salesman's Handbook has completed the first issue of 2000 of the new Handbooks and turns over as part of the Committee report a large amount of material for future issues. The general plan of the Handbook comprises a desk filing case for the loose-leaf sheets not in actual use by the salesman, and special pocket binders of ¾-inch capacity provided with an automatic opening device. The first issue to each member of the Commercial Section consists of a desk file, a pocket binder, 600 pages of loose-leaf sheets which constitute the original instalments of a reference library containing information and data for electrical salesmen which will be amplified from time to time through the issue of additional sections and data sheets. The present issue provides in the first section fundamental information relating to the Salesman and His Work a section on Illumination leading up to data sheets for typical installations in classified trades; a Power section covering general information relating to motors and electric drive accompanied by a comprehensive collection of information upon power required in all forms of machinery found in ordinary practice, followed by a large number of data sheets giving the details of typical installations in classified industries and the current consumption for a period of a year, and an Electric Vehicle section covering general information and specifications followed by a large number of data sheets from fleets of electric vehicles of various sizes used in different classes of transportation service.

The appearance of two such notable publications at one Convention would in itself suffice to give it distinction.

Public Service Commission Annual Report Forms

An interesting piece of work undertaken by the office within the last few months has been the securing from the various Public Service Commissions copies of the form of annual report required. Requests were sent to every Commission and the result is that twenty-four forms of such annual reports have been received from as many Commissions. The number would have been greater but for the fact that some were said to be out of print and others not yet formulated. These forms have been bound up and are at this convention in the care of the Accounting Committee. They present a most extraordinary range from merely a single sheet in one State up to nearly one hundred pages in another. So far as known, this is the only collection available for comparative study by the membership or possibly anywhere outside of the Association files. While there are forty-eight Commissions in existence, it would appear that about twenty-eight is the number of those having the regulation of such utilities as the central station industry or making these requirements.

Conclusion

Thus is roughly summed up what has indeed been a very busy year in the history of the Association, with increased membership; larger income and expenditure; new standing and special committees; a record number of committee meetings held at headquarters—so that a new Committee Room has been in constant use, five such meetings being held there within two days; new publications; and various new activities making more urgent demands on time and attention. The many gratifying acknowledgments from members for prompt information and service rendered have been a great stimulus to the whole force in the performance of duty; and the Secretary desires in conclusion respectfully to place on record his high personal appreciation of the intelligence, loyalty and efficiency of the staff, without which any effort of his own would have been in vain.

President McCall: For your information I might say that these questions, centralizing the New York office, the publication of Rate Research, and the question of extending the publication of the literature of the Association, are now being considered by the Executive Committee.

A motion is in order to accept the Report of the Secretary.

(On motion duly made and seconded, the Report was accepted.)

The next number on the program is the Report of the Insurance Expert, Mr. W. H. Blood, Jr., of Boston, Chairman.

REPORT OF THE INSURANCE EXPERT

Nothing of special importance has come up in the field covered by the Insurance Expert of the Association during the past year, but many routine matters have been attended to from day to day in the interests of the Association and its individual members.

The relations with the Underwriters continue to be harmonious and each year brings a better understanding between the fire insurance people and the owners of electric lighting properties. The National Electrical Code, which formerly was under the jurisdiction of the Underwriters' National Electric Association, has been transferred, as has already been reported, to the National Fire Protection Association. On the Electrical Committee of this Association are representatives of all the electrical societies which are national in character. Your Insurance Expert represents the National Electric Light Association on this committee and on several sub-committees. This arrangement seems to be working out well, for it puts us in close touch with all proposed changes in the National Electrical Code and our endorsement or protest of new rules is generally listened to. The Underwriters, however, are still in control, and it is perfectly proper that they should be, for they alone are able to enforce the rules by an increase in rates when they are not complied with. The National Electrical Code is quite generally recognized as representing good engineering practice in the installation of electric wires and electric apparatus, and as being a guide in the prevention of electrical fires.

Many cities have accepted the Code without revision. It is unfortunate that in some places municipal inspectors clothed with authority, but without experience, have seen fit to modify or "to adapt the Code to local conditions." Such procedure is, we believe, wholly unnecessary and most undesirable. The Code is simply a codification of rules which are drawn up on broad lines, suitable for universal application; they are just as good for Portland, Oregon, as for Portland, Maine.

The Code as a whole is generally respected. It is to be regretted, however, that we still have with us the "sidewalk contractor" or "curbstone wireman." He does his work, collects his money and flies by night to some new field. His inferior work discourages the reputable contractor who is our friend and ally, and he also introduces into our business a menace which we are constantly striving to eliminate. Publishing an approved list of the names of reliable contractors is a method that some electric light companies employ to eliminate unreliable wiremen.

The operation of competitive electric lighting plants has sometimes been the cause of bad wiring construction. The fear that "the other company" will connect up a customer even though it is known that the wiring is unsafe, sometimes is a deciding factor where ruinous competition exists. Cheap wiring is demanded and cheap wiring often means unsafe wiring. The elimination of competition and the establishment of a regulated monopoly generally cures this evil.

The National Electrical Code is revised but once in two years; this was the off year, but a meeting of the Electrical Committee of the Association is held every year, and at the meeting which was held April first, various matters of importance were considered. A report of the meeting appears in the May issue of the N. E. L. A. BULLETIN.

It is conceded that the rule on "Constant potential pole lines; over 5000 volts," while satisfactory a few years ago, is out of date, due to progress in the electrical art, and that it should be re-worded. A sub-committee has this rule under consideration and it is expected that in 1915 the matter will be thoroughly discussed and that a modification of the rule, which agrees with present practice, will be passed.

The arbitrary attitude of certain municipalities of unnecessarily limiting the voltage which may be used in city streets is a genuine misfortune. It discourages the use of electricity because it makes its installation more expensive and tends to encourage the use of other forms of light and power which are decidedly more dangerous. A reasonable consideration of this matter by some cities would help to build up the communities and likewise benefit the electric lighting companies.

In some sections of the country there seems to be a demand for permission to use renewable or refillable enclosed fuses, while in other localities the practice is deplored. Each side seems to have just one argument in its favor. Those who advocate the use of a renewable fuse contend that the lower cost justifies the refilling, while the other side claims that the risk of authorizing engineers, janitors and even amateur wiremen to become fuse manufacturers is too great. If some compromise could be effected it would seem to be of advantage to the industry, for while we would welcome a reduction in the cost of fuses, it must not be made at a sacrifice of safety.

The next public meeting at which changes in the National Electrical Code will be considered is to take place in New York in March, 1915. It is anticipated that at this meeting a large number of unusually important items vitally affecting the electric lighting companies will be considered. Your Insurance Expert will be present at this meeting and will officially represent the National Electric Light Association, but those of you who can attend should be present and support your representative. Your Insurance Expert would appreciate it if, from time to time, suggestions as to advantageous changes in the Code are sent to him, as well as a notification of any existing rules which contain objectionable features.

In 1910 your attention was called to a case of a company at Hobart, Oklahoma, having a total capitalization of $135,000, which was sued by the insurance companies for $90,000 on the allegation that through the negligence of the lighting company a department store was set on fire and burned. This case is still in the courts but is being constantly watched and it seems probable that it will come to trial this fall. With the evidence before us it is hard to see how a jury can find against the company, but the far reaching effects upon the industry of an adverse decision must be considered. It is important that this and similar cases should not be neglected. Your Insurance Expert holds himself in readiness to assist in all such cases.

Attention was last year called to the good work which is being done by some inspection bureaus in the examination of electric lighting properties with recommendations as to the curing of defects, thus bringing about reductions in insurance premiums and less liability of fires. In my last annual report to the Association I advocated the employment of one of these bureaus to prepare pamphlets for the use of the members of this Association, explaining certain fire hazards and means for their elimination. The Executive Committee during the year approved the employment of such a bureau but could not see its way clear to justify the expense which was entailed. A modification of the plan suggested has been formulated, largely reducing the expense, so that for a few thousand dollars all of the members of the Association may get the value of expert suggestions, which in the end may be the means of saving millions of dollars in fire losses. Your Insurance Expert recommends that the incoming administration give this matter early and serious consideration.

PRESIDENT MCCALL: Gentlemen, this Report of the Insurance Expert is before you. While Mr. Blood works quietly during the year, and is very little seen by most of you, there is an opportunity once a year to ask questions or to discuss any phase of the Code or Report which may interest the members. Is there any discussion?

Personally I would like to suggest, that that part of the Code referring to limitations in high voltage be looked after before 1915 if it is possible to make such a change. Have you anything to say on that subject, Mr. Blood?

MR. BLOOD: The Committee which has that matter in charge, Mr. President, is an exceptionally good one and is working very carefully and painstakingly on the matter. No public work or approval of the work can come up before March, 1915.

MR. LEONARD FITZGERALD, Gary, Ind.: It occurs to me to say in connection with the report presented by Mr. Blood, that during the past year we have been successful in working with our City Council, and having it appoint the fire underwriters' inspector as city electrical inspector. This has eliminated a good deal of the friction and trouble we formerly had.

PRESIDENT MCCALL: Are there questions to be asked or further discussion in connection with this Report? If not, a motion to accept the Report will be in order.

(On motion duly made and seconded, the Report of the Insurance Expert was accepted.)

The next business in order will be the Report of the Committee on Progress, by Mr. T. C. Martin, of New York City.

REPORT OF THE COMMITTEE ON PROGRESS

GENERAL CONDITIONS OF THE INDUSTRY

In 1884 there were held in Philadelphia, under the auspices of the Franklin Institute of that city, the first electrical exhibition and the first International Electrical Congress ever held on American soil. The exhibition was a direct result of the congress, and from both sprang immediately the American Institute of Electrical Engineers. The chief feature of the exhibition was the remarkable display of arc and incandescent lamps and of dynamos to generate current for them. Electric lighting and central station work received an immediate impetus; the attention of capitalists and engineers was directed to the young and growing industry, and early in 1885 the National Electric Light Association was called into existence at Chicago to represent it, and organize its forces. There was rapid growth in the Association even in those days. In February, 1885, at the Chicago meeting, 53 companies, operating and manufacturing, had delegates; at New York, six months later, 74: at Baltimore, early in 1886, there were 102 companies represented; at Detroit, later the same year, 124; and at Philadelphia, early in 1887, the number reached 159. The records would indicate that some 500 persons attended that fifth meeting in Philadelphia in February, 1887. Now, after 27 years of absence from the city whose impress on our art and industry is so deep, we come back with a membership of over 13,000 at the time this report is in preparation, and of that total nearly 1400 is of operating and manufacturing companies. The corporate membership would indeed be much larger but for the incessant consolidations and combinations of plants and systems that have gone on during the period that has intervened. Large as the present membership may seem there is still room for indefinite expansion, as will be evidenced by some of the statistics of growth that follow.

The fact is probably familiar to most members of the Association that the U. S. Bureau of the Census, under the requirements of an Act of Congress, makes a compilation of the statistics of the electrical public utilities once every five years. Every private and municipal plant is required to make a return, inclusive of figures relative to the leading features of the industry; and the result is, there becomes available a vast mass of interesting and useful data, the like of which no other country can furnish. It is perhaps natural that the United States, where the electrical arts have exhibited their greatest development, should lead also in their statistical interpretation. In this work for the central station industry, the National Electric Light Association, has had the honor to assist the Government, and the schedule under which the data of 1912 were collected was drawn up in conferences between representatives of the Public Policy and Accounting Committees and Mr. W. M. Steuart, the chief statistician of the Census Bureau Department of Manufactures. The figures of 1912, representing the latest five-year period, are herewith given as compared with those of 1912 and 1907:

	1912	1907	1902	Per Cent of Increase 1902-1912
Number of stations*	5,221	4,714	3,620	44.2
Commercial	3,659	3,462	2,805	30.4
Municipal	1,562	1,252	815	91.7
Total income†	$302,115,599	$175,642,338	$85,700,605	252.5
Light, heat and power, including free service	$286,980,858	$169,614,691	$84,186,605	240.9
All other sources	$15,134,741	$6,027,647	$1,514,000	899.7
Total expenses, including salaries and wages‡	$234,419,478	$134,196,911	$68,081,375	244.3
Total number of persons employed	79,335	47,632	30,326	161.6
Total horse power	7,528,648	4,098,188	1,845,048	308.0
Steam engines and steam turbines:¶				
Number	7,844	8,054	6,295	24.6
Horse power	4,946,532	2,693,273	1,394,395	254.6
Waterwheels:				
Number	2,933	2,481	1,390	111.0
Horse power	2,471,081	1,349,087	438,472	463.6
Gas and oil engines:				
Number	1,116	463	165	576.4
Horse power	111,035	55,828	12,181	811.5
Kw rating of generators	5,134,689	2,709,225	1,212,235	323.6
Output of stations, kw-hr	11,502,963,006	5,862,276,737	2,507,051,115	358.8
Estimated number of lamps wired for service:				
Arc	505,395	§562,795	385,698	31.0
Incandescent and other varieties	76,507,142	§41,876,332	18,194,044	320.5
Stationary motors served:				
Number	435,473	167,184	101,064	330.9
Horse power	4,130,619	1,649,026	438,005	843.1

*The term "station," as here used, may represent a single electric station or a number of stations operated under the same ownership.

†Exclusive of $36,500,030 in 1912, $20,093,302 in 1907, and $7,703,574 in 1902, reported by street and electric railway companies as income from sale of electric energy for light or motor service or from sale of energy to other public service corporations.

‡In addition to salaries and wages, includes the cost of supplies and materials used for ordinary repairs and replacement, advertising, fuel, mechanical power, electrical energy purchased, taxes, charges for depreciation, and all other expenses incident to operation and maintenance.

¶Includes auxiliary engines.

§Includes for purposes of comparison, 7082 arc and 267,997 incandescent lamps reported by the electric companies to light their own properties. Lamps used for such service were included in the total number reported in 1912.

The figures as given for the continental United States show general and remarkable gains for the decade 1902-12. The number of commercial stations or plants increased from 2805 in 1902 to 3659 in 1912, or 30 per cent. The number of municipal plants increased from 815 in 1902 to 1562 in 1912, or 92 per cent, but their relative proportion in the industry has declined. The total income for 1912 amounted to $302,115,599, as compared with $85,700,605 in 1902, or an increase of 252 per cent. The total expenses, including salaries and wages, in 1912, amounted to $234,419,478, as compared with $68,081,375 in 1902, or an increase of 244 per cent. The total number of persons employed in 1912 was 79,335, as compared with 30,326 in 1902, or an increase of 162 per cent. The total horse power of the steam engines and steam turbines was 4,946,532 in 1912, as compared with 1,394,395 in 1902, or an increase of 255 per cent. The horse power of the water-wheels was 2,471,081 in 1912, as compared with 438,472 in 1902, or an increase of 464 per cent. The output of stations amounted to 11,502,963,006 kw-hr in 1912, as compared with 2,507,051,115 in 1902, or an increase of 359 per cent. The estimated number of arc lamps wired for service in 1912 was 505,395, as compared with 385,698 in 1902. or an increase of 31 per cent. Incandescent and other varieties of lamps wired for service, however, numbered 76,507,142 in 1912, as compared with 18,194,044 in 1902, or an increase of 320 per cent. The horse-power rating of the stationary motors served with electricity amounted to 4,130,619 in 1912, as compared with 438,005 in 1902, or an increase of 843 per cent. The Census Bureau is careful to specify that the term "station," as used by the Census Bureau, may represent a single electric station or a number of stations operated under the same ownership, hence the difference in the number of stations reported by the government and those contained in the *McGraw Electrical Directory,* which showed 5823 plants in October, 1912. Some further data as to present conditions is given from the *Directory* of October, 1913.

The report for electric railways made by the Census Bureau contains statistics for 169 companies which report central-station work. These are counted as a part of the electric railway systems and are not included in the total number of 5221 establishments shown in the central-station report. Reports of important isolated stations have also been excluded unless a considerable quantity of electrical energy is sold for commercial purposes. It

SUMMARY OF CENTRAL STATIONS REPORTED BY STATES

STATE.	Number of Plants.	Number of new in this issue.	Number carrying electrical supplies.	Number of Municipal Plants.	Number having day circuit.
Alabama	71	0	43	35	37
Alaska	9	0	8	0	8
Arizona	24	0	15	1	14
Arkansas	78	1	50	18	52
California	159	1	84	14	118
Colorado	94	1	61	11	56
Connecticut	53	0	23	6	35
Delaware	15	0	6	6	5
Dist. of Columbia	2	0	0	0	1
Florida	60	2	33	15	28
Georgia	126	0	66	69	53
Hawaii	4	0	2	0	2
Idaho	53	0	35	2	36
Illinois	369	3	266	91	186
Indiana	226	2	132	69	114
Iowa	239	3	189	57	155
Kansas	168	2	111	72	103
Kentucky	93	3	63	13	42
Louisiana	53	2	28	23	36
Maine	96	5	57	5	51
Maryland	43	1	28	13	17
Massachusetts	133	4	50	31	91
Michigan	251	2	165	107	136
Minnesota	190	1	145	95	107
Mississippi	80	0	49	41	36
Missouri	187	2	123	61	99
Montana	43	0	30	2	23
Nebraska	149	2	105	52	80
Nevada	13	0	9	1	7
New Hampshire	59	2	33	2	31
New Jersey	95	1	27	11	68
New Mexico	23	0	17	3	18
New York	364	1	172	49	213
North Carolina	109	1	54	43	53
North Dakota	46	2	34	9	22
Ohio	302	1	170	106	156
Oklahoma	125	6	72	52	93
Oregon	83	0	52	8	52
Pennsylvania	323	5	164	41	211
Philippine Islands	4	1	4	0	3
Porto Rico	3	0	3	0	3
Rhode Island	10	0	0	1	9
South Carolina	66	0	32	17	39
South Dakota	74	0	52	13	41
Tennessee	91	0	61	27	46
Texas	261	3	196	17	167
Utah	40	2	21	14	26
Vermont	70	3	43	12	38
Virginia	77	0	38	14	41
Washington	115	1	88	10	66
West Virginia	59	1	33	6	28
Wisconsin	233	0	160	74	123
Wyoming	26	0	21	2	17
	5,723	67	3,519	1,443	3 291
Canada	451	4	243	160	204
Mexico	63	0	38	0	43
West Indies	8	0	5	0	4
Rep. of Panama.	2	0	1	0	1
British Guiana	1	0	1	0	1
Total	6,248	71	3,807	1,603	3,544

Number of Plants having only D. C. Circuit	927
Number of Plants having only A. C. Circuit	4,057
Number of Plants having both D. C. and A. C. Circuit	890
Number of Hydro-Electric Plants, in whole or in part	1,367
Number of Plants supplying Steam for Heating	262
Number of Plants reporting Manufacture of Ice	295

will be noted that an income of $36,500,000 is to be added from electric railways, making a total of about $340,000,000. The average rate of increase has been over 25 per cent for 10 years, which would bring the total for 1914 in excess of $450,000,000. The actual returns for electric railways as to gross income for 1912 were $585,000,000, not including electrified steam railways. The gain in that big field is about 13 per cent per annum. These two great twin electrical industries are therefore giving the public service to-day for which it pays over a billion dollars a year. In the near future it should be and will be the function of the central station to supply most of, if not all, the electrical energy required for transportation on street or main railway lines. There is absolutely no necessity for its separate production, and the numerous contracts made in large cities, and for even big trunk lines, show that the logic of the situation is already keenly appreciated in the traction world.

The figures noted as to municipal plants are a little misleading. The gain in their number is no criterion of their gain in importance. A separate return shows their entire income to be barely $23,000,000, so that they have not increased at all in that respect, being still less than 10 per cent of the total. The present extension of transmission lines is depriving a great many of them of the only warrant for existence they had, namely, of supplying by taxation small communities where there was no invitation to private capital and enterprise. The transmission system can always undersell, and furnish the little town or village more cheaply than the local municipal plant has been able to do.

The census figures for electrical manufacturing are not taken in the same years as those of the utilities which employ or consume most of the apparatus. This is in many respects unfortunate, and it would be well if the figures were in synchronism. The latest government figures of electrical manufacturing available are those of 1909, issued in 1913, and the next will be those of 1914, available at best two or three years later. The statistics cover only strictly electrical products and do not include the manufactures of wood or iron poles, glass or porcelain insulators, bare iron or copper wire, or any electro-chemical or electro-metallurgical products. There were engaged in the manufacture of electrical machinery apparatus and supplies in the United States in 1909 a total of 1009 establishments, employing altogether 105,600 persons, of whom 102,950 were wage earners. The total capital invested in the industry as restricted above was $267,844,432 and the value of the products for that year totaled $221,308,563.

There were 13,882 direct-current and 2909 alternating-current generators built in 1909, with an aggregate value of $13,081,048 and an average rating of 84 kw. Transformers numbering 76,729 and valued at $8,801,019 were manufactured. The production of switchboards was valued at $5,971,804. A total horsepower of 2,733,418 and a value of $32,087,482 were represented in the 504,030 motors turned out during 1909. Of the total at least 244,123 motors were directly for power purposes, of a total 1,623,677 h-p. There were 199,113 fan motors. Arc lamps to the number of 123,985 and with a total value of $1,706,959 were produced. Incandescent lamps showed a valuation of $15,714,089 and a total number of 66,776,997, of which about one-fifth then represented tungsten lamps. The insulated wire and cable manufactures in 1909 constituted the largest single item in the electrical manufacturing industry, the total value made in the United States during 1909 being $51,624,731, of which $40,250,572 was the value of the product of concerns in the industry proper and the remainder was that of companies engaged primarily in wire drawing or other industries. Only a small number of the producers of insulated wire and cable drew the wire which they insulated; and the wire itself, though not an electrical product, was of course made largely from electrolytically-produced copper. Such figures can be brought up to date by the application of an average per cent rate of increase, which for the whole electrical field has not fallen much below 20 per cent per annum for the whole in a period of nearly a quarter of a century, but is naturally lower in times of depression. One of the larger manufacturing companies turned out over 100,000 fan motors in 1913, and 380,000 meters. Mr. E. L. Jones, speaking before the Chicago Jovian League on January 19, said that it had been conservatively estimated that $25,000,000 would be spent during the year 1914 for automobile electric-starting equipments. About $2,500,000 would go to the manufacturers of storage batteries and a like amount would be spent for gears and silent chains. The starter manufacturers' business would amount to about $15,000,000. We have traveled far when such items, in which we are all interested but to which we give so little attention, can assume this magnitude.

SOME DATA ON DEVELOPMENT

The development and rapid advance of the industry are brought out in other statistics. For example, the accompanying table gives statistics on the output, peak load and load-factor of the generating stations of the Niagara Falls Power Co., Commonwealth Edison Co., New York Edison Co., Philadelphia Electric Co., Edison Electric Illuminating Co. of Boston and the Edison Electric Illuminating Co. of Brooklyn. The Commonwealth Edison system still has the highest peak load and the largest output of the purely central-station systems, chiefly because of its great railway load. The load-factors of the Edison companies in New York, Philadelphia, Boston and Brooklyn, it will be noted, did not vary greatly during the year, and in this connection the peak load, total output and load-factor of the Niagara Falls Power Co., are of particular interest. All companies show substantial increases in output. The Commonwealth Edison, owing to large accessions of railroad load during the year and an increase of nearly 50 per cent in the commercial business contracted for, shows an increase in output of between 18 per cent and 19 per cent. The Philadelphia Electric Co., owing to large railway loads secured, experienced the largest percentage gain in output during the year (approximately 25 per cent), while New York, Boston and Brooklyn show increases of about 11 per cent. The increase in output of the Niagara Falls Power Co., is over 9 per cent.

DATA ON LARGE GENERATING SYSTEMS

System	Peak Load in Kw	Date of Peak Load	Yearly Output in Kw-hr	Yearly Load Factor, Per Cent
Niagara Falls Power Co..	133,800	Dec. 8	949,886,570	81
Commonwealth Edison ...	271,000	Dec. 15	950,000,000	42–43
New York Edison	225,902	Dec. 23	685,947,000	34.7
Philadelphia Electric	76,133	Dec. 11	229,529,589	34.4
Boston Edison	63,131	Dec. 16	179,990,611	32.5
Brooklyn Edison	48,400	Dec. 23	139,737,007	33

On December 31, 1913, the total connected load on the system of the Commonwealth Edison Co. of Chicago was 908,204 hp. Of this amount 536,239 hp was motor load or industrial load, and

371,965 hp lighting load. The industrial load includes 255,629 hp, representing the load of the surface and elevated railways. During the year the power division of the contract department of the company closed power contracts amounting to 43,496 hp. The street-railway load was increased 78,955 hp, and the increase in the lighting load was 54,877 hp. The total increase, therefore, was 107,328 hp.

Other indications of the remarkable stability of the industry associated with unlimited power of expansion, because of the infinite diversity factor found in trying to satisfy all the demands and opportunities for electric service and utilization of resources, are given in the reports of our member companies. Two may be selected as illustrations—Boston and St. Louis. The report of the Edison Electric Illuminating Co. of Boston, Mass., for the year ended June 30, 1913, shows a total income of $6,365,874, compared with $5,787,345 for 1912, and total expenses of $3,558,721, compared with $3,195,718 a year before. The company had 52,446 customers in Boston and thirty-eight surburban municipalities which it serves, compared with 43,246 in 1912, and its total energy output at the switchboard was 171,783,312 kw-hr, as against 150,987,350 kw-hr. in 1912. Its receipts from the sale of energy for commercial lighting were $4,248,441 in 1913, compared with $3,883,679 in 1912, and its sales for industrial purposes totaled $1,257,612, compared with $1,112,277 in the preceding year. During the fiscal year the company declared dividends of 12 per cent on the par value of its stock, amounting to $1,950,333. During the fiscal year 1913 the company used 167,097 tons of coal at an average cost of $3.80 per ton. In 1912 its fuel consumption was 141,668 tons, costing $3.56 per ton. The maximum station load was 60,143 kw, occurring December 18, 1912, the previous year's maximum being 55,144 kw. The company sold 118,023,078 kw-hr, compared with 102,930,250 kw-hr in 1912. The total connected load on June 30, 1913, was 175,146 kw as against 153,583 kw last year. The company supplied 2963 kw in municipal arc lamps, 4658 kw in commercial arc lamps, 819 kw in municipal incandescents, 97,825 kw in commercial incandescent-lighting service and 69,881 kw in motors. It had 8465 customers using energy for motors, etc, and 43,472 customers using only incandescent lighting service. During the year it gained 1002 customers on its motor circuits. The generating plants of the company have a total rating of 101,400 kw, of which 90,000 kw is the rating of the main station at L Street, South Boston, in the form of three-phase, 60-cycle units, 1000 kw is in 3-phase generators at Waltham and 10,400 kw in direct-current machines at the Atlantic Avenue station, Boston. Two 12,000-kw and two 15,000-kw turbo-alternators are now included in the company's equipment.

The Union Electric Light Co. of St. Louis reported that while the energy sold to residence and commercial customers during 1913 exceeded that in 1912 by 17.5 per cent, the gross revenue increased only 0.8 per cent, owing to the general rate reduction made in December, 1912. The financial operations of the company for the year resulted as follows: Gross revenue, $3,683,107.29; operating expenses, $2,145,241.32; gross income, $1,537,865.97; interest charges, $855,106.22; net income $682,759.75. The following statistics may be quoted in comparing the business of 1913 with that of 1911 and 1912: The average rate per kilowatt-hour for lighting purposes decreased 14.8 per cent, as compared with 1912, and 23.9 per cent, as compared with 1911. The average rate received from motor-service sales decreased 12.9 per cent and 21.7 per cent, as compared with 1912 and 1911, respectively. During 1913 the greatest load carried was approximately 76,000 hp. Notwithstanding the fact that approximately one-third the company's power requirements were supplied by the Keokuk station, nearly 300,000 tons of coal were used at the Ashley Street station, St. Louis. The total pay-roll of the company for 1913, covering an average of 1100 employees, aggregated over $889,000, an average of $2,435 per day. In the extensions and improvements of the system the company expended during 1913 the sum of $1,174,460 for new property and equipment, and in addition thereto $130,000 was expended in replacing obsolete or worn-out property and approximately $138,000 to maintain equipment. In extensions of the distribution system more than 2000 new poles were set, 411 miles of overhead wire were strung, 70 miles of underground conduit were laid and 30 miles of underground cable were installed. Taxes paid the city, state and federal governments in 1913 aggregated $293,500. This is equal to $6.85 per year for each customer served, and 4.05 mills per kw-hr sold for commercial light and power purposes.

The figures for San Diego, Cal., are very striking. The city is increasing rapidly in population, but the expansion of the public-utility interests has proceeded at even a greater rate. The inhabitants in 1910 numbered not quite 40,000. While it is difficult to estimate the population to-day, the local authorities agree that the figure is about 80,000. In 1905, when the San Diego Consolidated Gas & Electric Co., came under the management of H. M. Byllesby & Co., the city had an estimated population of 25,000. Since 1905, however, the gas and electric distributing systems have been extended to the suburbs and adjacent towns, and the population served with gas is now estimated at about 95,000, although the population served electrically is not quite so large. The electric output of the company named for the year previous to the advent of the new management was 1,116,817 kw-hr. For the calendar year 1913 the kilowatt-hour output was 14,404,741, an increase of 1130 per cent, while the population served increased less than 400 per cent. Between April 1, 1905, and January 1, 1914, the rating of the company's electric generators increased from 1220 kw to 8470 kw. There is now one electricity meter to every 5.6 of population, as compared with one to every 20.9 in May, 1905. The number of customers of the electric department of the company increased from 1181 to 17,054 and the total connected load from 1128 kw to 28,384 kw, the increase here being 2410 per cent.

It will be admitted that these are notable statistics from various cities and parts of the country, carrying with them evidence as to the stability of our enterprise. In this connection, some very interesting data were brought out by Mr. John E. Oldham, in a paper on public utility bonds, read at the 1913 Chicago convention of the Investment Bankers' Association of America. Public-utility bonds are considered to mean the bonds of corporations which furnish light, power, transportation or telephone service. Mr. Oldham gave instances to show that while muncipal and railroad bonds have depreciated somewhat in value in the last ten years, public-utility bonds have generally appreciated in value. A computation was made by the author to show the comparative returns from the three classes of bonds between 1901 and 1912. Representative public-utility, municipal and railroad issues were selected, and every effort was made to ensure a fair investigation. It was shown that the purchaser of $1,500.000 of public-utility bonds would have received an income on his total investment from date of purchase to July 1, 1912, of $487,500 and a gain in market value of $27,377, or a total of $514,877. From the municipal bonds the income was $326,551 and the loss due to depreciation $106,989, leaving a net return of $219,562. Income from the railroad bonds was $399,691 and the loss due to depreciation $70,065, leaving a net return of $329,626. Therefore, the net difference in favor of public-utility over municipal bonds was $295,315 and over railroad bonds $184,891. Public-utility bonds selected for this comparison should meet the following requirements: First, the net earnings should be equal to one and three-quarter times the interest charge; second, the corporation should have gross earnings equal to or exceeding $500,000; third, the original distribution of the issue among investors should be made by a prominent and conservative banking house or banking houses. As a safe division of gross earnings Mr. Oldham suggested 70 per cent for operation and depreciation, 20 per cent for bond interest and 10 per cent for dividends. Upon the financial make-up of the public-utility company will depend its ability to finance itself economically or otherwise.

At the same meeting of the Investment Bankers' Association Mr. Samuel Insull, president of the Commonwealth Edison Co. of Chicago, delivered a characteristic address on electrical securities and the "greater saturation of the dollar with energy." He brought out many points in a vivid manner, as to the higher economies aimed at and attained in the industry. Only about 40 per cent of the coal burned per unit generated ten years ago is now required for the same output. He exhibited a diagram showing that from 1896 to 1912 the business of the Commonwealth Edison Co., had grown from about $1,000,000 a year to about $16,000,000, the latter figure being divided into $8,000,000 for lighting, a little more than $4,000,000 for industrial motor service and a little less than $4,000,000 for energy for transportation purposes. Improvements in lamp efficiency helped to decrease the cost of electric light. As to the wholesaling of electrical energy, backed by the courage of a body of investors which has stood behind him for more than twenty years, Mr. Insull tried out several experiments, with the result that he has been able to bid for classes of business not until recently supposed to be within the reach of electric-service companies. The problem is to keep the investment working for as many hours of the day and as many days of the week as is possible. About 1902 this effort to fill up the valleys in the load curve as much as possible was begun, and it was so successful that by 1912 the Commonwealth Edison Co., was using its investment 31 per cent more of the time than ten years before. Notwithstanding what had been done, it was probable that the company still performed only one-third to one-half of the possible electric-service business of the city. If the business is to be developed to the saturation point in other communities as well as in Chicago, the enormous amount of money that will be required to take care of the investment necessary can be imagined.

In the production of electrical energy the greatest item of expense is not the cost of labor nor the cost of coal, but the cost of money. First-class selling engineering makes it possible to get useful work from the dollar of investment for the longest possible time. Mr. Insull made the interesting statement that he thought that if he had to choose between first-class construction engineering and first-class selling engineering he would select the latter, as it would give him the use of more money on the dollar invested with which to make up for possible mistakes made in constructing engineering. The item of paramount importance in the financial aspects of the electric-service industry is not the replacement value of the central station or the distribution system, but it is the assurance that the selling organization of the company under consideration is of the highest possible order.

In the supplying of electricity the tendency is toward conservatism of investment. This fact is illustrated by statistics which showed that in 1898, when the Commonwealth Edison Co., had something over 5000 customers, the investment per customer was $1,579. In 1912 the number of customers was nearly 180,000 and the investment per customer had dropped to $417. In 1898 the annual gross income per customer was $210 and in 1912 it had dropped to $87. Elucidating these figures, Mr. Insull made a striking statement when he said: "While steadily reducing our price and endeavoring to put ourselves in closer accord with our customers, we have at the same time produced a greater saturation of the dollar with energy." The gross income was 13.5 per cent of investment in 1898 and 21 per cent in 1912.

Another interesting curve showed that from 1896 to 1900 the company was selling on the average energy that cost it about 12 cents per kw-hr for a little over 10 cents. Nevertheless, the company made a profit, and this fact was largely due to the policy existing at that time of selling and installing isolated plants. However, it is a fact that at the time mentioned the company did not really know what it was costing to produce electrical energy. At that time central-station companies knew so little about their business that they did not really know how to figure cost.

Mr. Insull then went into the consideration of the diversity factor as bringing out the advantages of concentration of production in supplying a large area with different demands, as, for instance, in the State of Illinois. If the lighting business, local and interurban railways, ice-making plants, coal-mining, water-works, pumping, drainage pumping, and so on, are supplied from the same source of energy, striking economies can be effected by utilizing the diversity factor. Small, uneconomical plants are bound to disappear. Securities based on these small plants must be taken care of, of course, but centralized operation offers such a greatly extended field for industrial activity that it is possible to do this and also issue the new securities founded on the new business and the economies that may be effected by extended consolidation. Further, it is usually the case that small country properties are poorly constructed and inefficiently operated. Their absorption into the large system means better service for the community at a lower price. This, in turn, means increased popularity in the local centers and appreciation of the necessity for new securities.

Approaching these same questions from another angle, Mr. Insull said in an address delivered last year before the University of Illinois: "The development of the business of the generation and distribution of electric energy will probably have within the next quarter of a century great influence on the development of our local communities, not alone the large cities, but also the rural communities throughout our states, wherever there is any considerable density of population. Heretofore the business of producing and distributing energy on an economical basis has been confined very largely to our great cities, but the marvelous work of our engineers during the last two decades, the great changes that have taken place in connection with the development of the prime movers, the changes from the reciprocating engine to the steam turbine, the changes in the use of units of from 1000 hp to 5000 hp to units of from 20,000 hp to 40,000 hp are producing changes in the cost of energy which will lead to the centralization of production and distribution in the interests of economy. These changes, bringing about low cost to the producer and low price to the consumer, must have a very great effect in the development of the industrial interests of such states as Illinois.

"It is to-day not only a possibility but an actuality that the same advantages that we enjoy in large communities can also be enjoyed by the farmer, by the rural community, by the people having large areas to drain; the same privileges of low cost of energy can be obtained for them as are obtained for the users of energy in the large centers of population.

"Suppose any very small community anywhere in the thickly populated territory of the Mississippi Valley is able to obtain energy for manufacturing purposes at low cost. Assuming that in those communities the manufacturer can obtain the necessary labor, it stands to reason that one of the great troubles of modern life will be solved by cheap energy. At the present time large manufacturing interests, as a rule, cluster around large centers of population. The reason for that is that power is relatively cheap where they have a large population to draw on for their labor.

"But as this State and other surrounding states become studded with manufacturing establishments, the necessity which compels the workman to dwell in large centers of population, where living conditions are most unfavorable to him, will cease. He will be able to establish himself under conditions where he can get healthful environment for his family. Instead of living in a small, overheated, ill-ventilated tenement in the big city he will have the opportunity to establish himself practically amid the desirable conditions that those living in the country ordinarily enjoy.

"Surely, if this can be accomplished, if the living conditions of our people can be improved, if their children can be brought up under circumstances which will give them the foundation of good health, which will give them the opportunity of association in our country schools with that portion of the population, the farming population, which is the very backbone of the country, it is reasonable to expect greater satisfaction on the part of the workmen with their conditions and better relationship, because of a closer community of interest, with employers, and, in general, a better chance for the workman and his family."

CONDITIONS AS TO HOLDING COMPANIES

One of the most interesting developments in our industry has been the evolution of the holding company, around which subject an infinite amount of argument and discussion has been centered. Whatever may be the objections to holding companies in regard to the control of competing interstate railroads, or to competitive industrial enterprises, they can certainly have very little, if any, application in the electric lighting or electric railway field, where the conditions are entirely different in every respect. In his message of January 20th, President Wilson said: "We are agreed, I take it, that the holding companies should be prohibited." This is a broad, inclusive statement, but its meaning is not clear, and it would appear from later developments that it must be sharply narrowed. The aim and intent of the Government is supposed to be the giving of freedom to competition and to the interplay of forces and resources that might be checked by industrial monopoly; but it is altogether beyond conception that a holding company in the central-station field, with properties in Texas and Washington, Minnesota and Oklahoma, Missouri and Wisconsin, Illinois and Vermont, can be subject to such criticism because it is a means of restriction or repression. On the other hand, to the contrary, it would seem to be wholly something for the state and national government to encourage. In our industry such companies are organized to give better service, and particularly to smaller communities which now enjoy electric service they could not possess without the holding company. Such bodies are not organized to stifle competition but to give the benefit of expert aid in engineering, operation and finance to scattered plants whose existence otherwise would often not be warranted. There is also the element of buying larger quantities of material and supplies, under test, on an economic basis, with direct benefit to the consumer. Each local plant may be a monopoly within its own territory, but most modern political economists believe that municipal utilities must be regulated monopolies if the greatest efficiency is to be secured. The holding company organization is obligatory in a plan of this kind, because each local operating company must usually incorporate under the laws of the state where its service is given, so as to secure the right of eminent domain and other privileges. To go back to the old plan of separate ownership would not only greatly cripple many existing undertakings but would probably lead to the abandonment of some of them and the loss of their services to the communities concerned. It is interesting and satisfactory to understand that these radical differences have been appreciated, and that the "holding" company in the central-station field will be allowed to continue its beneficent career.

A very interesting study of this subject was made during 1913 by the *Electrical World*. The totals for the entire country, eliminating communities under 1000 population, show that, out of 4774 plants, 29 per cent have syndicate affiliations, 48 per cent are independent and 23 per cent are municipal.

The data from which the figures were compiled were taken from the *McGraw Electrical Directory, Poor's Manual* and *Moody's Manual.* The properties listed as controlled by syndicate interests are those in which there is a well-defined or widely known affiliation with an interest, usually large, that controls other similar properties. This affiliation of course has different forms. The connection may be through a holding company, an influential individual director, a common president or leading executive, or an engineering firm that is recognized as a dominant factor. The syndicate interests totaled 110.

The table herewith gives the figures, divided into groups of states. It indicates that the largest proportion of syndicate plants is in the Eastern States with the next largest in the New England States; the Western States are third. the Middle States fourth and the Southern States fifth. The proportion of independent plants is largest in the Southern States. with the other groups of states following in the order named: New England, Western, Eastern and Middle. The percentage of municipal plants is largest in the Middle States, with the Southern States next and the Western States third.

TABLE II—CENTRAL STATIONS BY GROUPS OF STATES

	Syndicate Control			Independent		Municipal		
	Number of Syndicates	Central Stations	Per Cent	Number	Per Cent	Number	Per Cent	Total
New England States	6	224	40	283	50	55	10	562
Eastern States	5	385	43	433	47	91	10	909
Middle States	9	363	22	717	45	524	33	1604
Southern States ...	13	170	17	534	55	273	28	977
Western States	15	252	35	354	49	116	16	722
Total	48	1394	29	2321	48	1059	23	4774

The proportion of syndicate plants advances from 20 per cent of the total number of plants for the smallest towns in the compilation to 44 per cent in the next group, that based on the returns from communities of 5000 to 10,000 population. In the group of cities from 10,000 to 50,000 population, 63 per cent of the plants, according to the statistics, are operated by syndicates, while in the next larger group, based on the returns from cities of 50,000 to 100,000 population, the proportion is 84 per cent. In the cities of the largest size, the proportion is 87 per cent.

Conversely, the proportion of independent plants decreases as the size of the community increases. Where the proportion of independent plants was 55 per cent of the total in the towns of 1000 to 5000 population, it decreased to 35 per cent in the towns of the next larger group with between 5000 and 10,000 population. In the group of cities of 10,000 to 50,000 population the proportion was 26 per cent. In the group of cities of 50,000 to 100,000 population the proportion was 10 per cent and it was the same in cities of the largest size.

The proportion of municipal plants decreases as the size of the community increases. Where it was 25 per cent of the total for the towns of 1000 to 5000 population it was 21 per cent in the next larger group. The proportion was 11 per cent in the cities of 10,000 to 50,000 population, 6 per cent in the next larger group and 3 per cent in the group of the largest cities.

The figures should not be taken as an indication that the service in the towns and cities listed is furnished exclusively either by a syndicate, an independent or a municipal plant. In other words, a given town or city may have a syndicate plant, one or more independent plants and a municipal plant. In such a case, the total number of plants furnishing electrical service would be listed under the respective headings in the table.

THE PUBLIC SERVICE COMMISSIONS AND REGULATION

The modern idea or principle that the public utility is inevitably a monopoly and should, therefore, be regulated, has found increasing acceptance during the past year, as evidenced by the fact that no fewer than ten new public service commissions were established in 1913. Two of the most important laws are those passed in the great states of Illinois and Pennsylvania. Some of the provisions may be briefly noted here as indicative of the spirit of the times and the conditions under which public utility managers have to operate.

The act providing for the regulation of public utilities in the State of Illinois went into effect on January 1, 1914, and substitutes for the old Railroad and Warehouse Commission, a State Public Utilities Commission, consisting of five members, not more than three of whom may be affiliated with the same political party. The annual salary of each commissioner is to be $10,000. Before entering upon the duties of his office each commissioner is required to give bond, under security approved by the Governor, in the sum of $20,000. The usual restrictions are placed on all official connections with any corporation or person subject to regulation by the commission, and upon receiving any emoluments therefrom.

The commission has general supervision over all public utilities, and it must examine these and keep informed as to their franchises, capitalization, rates and management and operation of property. The term "public utility," as used in the act, includes every corporation, company, association, joint stock company, partnership or individual, their lessees, trustees or receivers appointed by any court (except, however, such public utilities as are or may hereafter be owned or operated by any municipality) that owns, controls, operates or manages within the State, directly or indirectly for public use, any plant. equipment or property for the transportations of persons or property or the transmission of telegraph or telephone messages within the State, or for the production, storage, transmission, sale, delivery or furnishing of heat, cold, light, power, electricity or water, or for the conveyance of oil or gas by pipe line, or for the storage or warehousing of goods, or for the conduct of the business of wharfinger, and that may own or control any franchise, license, permit or right to engage in any such business. The term "service" is used in its broadest and most inclusive sense and includes not only the use or accommodation afforded customers or patrons but also any product or commodity furnished by the utility and the plant or equipment and any facilities employed by the utility and devoted to the purposes of the corporation. The word "rate" includes every individual or joint rate, fare, toll, charge, rental or other compensation of any public utility or any two or more of such, and any rule, regulation, practice or contract relating thereto.

In the matter of stock and bond issues, the act states that the power of public utilities to issue evidences of indebtedness and to create liens on their property is a special privilege, the right of supervision, regulation, restriction and control of which is vested in the State to be exercised by the commission. No issues payable at periods of more than twelve months from the date thereof may be issued except with the approval of the commission, and then only for the acquisition of property for extensions, improvements or additions, for the lawful re-funding of its obligations, or for reimbursements of moneys paid from income, not received from sale of evidences of indebtedness within five years after the application for authorization of the new issue. Before issuing any authorization the commission, when it is deemed necessary, "shall make an adequate physical valuation of the property of the public utility, but a valuation already made under proper public supervision may be adopted either in whole or in part, at the discretion of the commission." Short-term notes for periods of not more than twelve months may be issued without the consent of the commission, but may not be renewed for an aggregate period of longer than two years. The commission has no power to authorize the capitalization of the right to be of a corporation, or to authorize the capitalization of any franchise, license or permit in excess of the amount (exclusive of any tax) actually paid to the State as consideration therefor. The commission also has full power of supervision and restriction over all the forms of intercorporate relations. The commission may also ascertain the value of the property of any public utility in the State.

Rates are required to be just and reasonable, and unless the commission otherwise orders no change shall be made by any public utility in any rate, classification, ruling, privilege or facility except after thirty days' notice to the commission and to the public. The commission has power, upon a hearing upon its own motion or upon complaint, to investigate any single rate, classification, etc, or the entire schedule, and to establish new rates, classifications, etc, in lieu thereof. The penalty for a violation of an order of the commission by a corporation is a fine of not less than $500 nor more than $2,000 for each offence, and a person violating its orders shall be punishable by a fine not exceeding $1,000 or one year's imprisonment, or both.

Some of the phraseology is interesting, to say the least. Section 8, for example, provides that the commission "shall inquire into the management of the business" of all public utilities. This is certainly a "large order," liable, it may be hoped, to a minimum of actual interpretation. Subject to the infringement of the common law and the protection of the safety, comfort and proper service of customers, it would seem that the management of a utility should be left to its managers without the intrusion and surveillance of other people, "Paul Prys" not charged with such serious responsibilities.

Section 9 says that whenever required by the commission every public utility shall deliver to the commission inventories of its property. This section should be read in connection with the reference to physical valuation in the part of the law which relates to the approval of new security issues. Under that section the commission, when it deems necessary, shall make an "adequate physical valuation of all property." In Section 22 is a stipulation that in cases of reorganization the capitalization authorized by the commission "shall not exceed the fair value of the property involved." There is a broader, but less definite, reference to valuation in Section 30, which deals specifically with this subject. The commission receives power "to ascertain the value of the property of every public utility * * * and every fact which in its judgment may or does have any bearing on such value." The intent is, obviously, to give the commission full power to determine what, in its opinion, value comprises and the extent to which different elements constituting total value may be taken into consideration. In other words, what the law does not do specifically it puts within the power of the commission to do, as its judgment dictates. There is more room for justice in this section than in the restriction to physical valuation imposed by the section bearing upon security issues.

One of the "bones of contention" in the adoption of this law was the effort to put into it a "home rule" provision, such as prevails in some States, giving a local commission very full powers. The law provides that no contract or agreement as to franchises shall be valid unless it is approved by the commission. There is another clause, of dangerous character, exempting municipally owned or operated utilities from the jurisdiction of the commission. Without wishing to be hypercritical, this can only be described as another illustration of the unwillingness of muncipal plants to stand up alongside the private utilities, and be "counted" or "searched." It is a significant reluctance.

On July 26, 1913, Governor Tener of Pennsylvania affixed his signature to the new public service law. It is a rather formidable document of about 100 pages and 30,000 words, and may be regarded as in some respects a better type of "control" legislation than that embodied in the Illinois law, which also became operative on January 1, 1914.

The new Pennsylvania Commission consists of seven members appointed by the Governor by and with the consent of the Senate. Each commissioner at the time of his appointment shall be a resident of Pennsylvania and a qualified voter there for a period of at least one year next preceding his appointment, and he must also be not less than thirty years of age. No person may be appointed to the commission or hold any position under it who occupies any official relation to any public service company doing business in the State or who holds any other appointive or elective office in the State or any municipality. Each of the commissioners is to receive an annual salary of $10,000, except the chairman, to whom $500 additional is given. The commission has a secretary and a general counsel, who receive $5,000 and $7,500 respectively. The commission is also authorized to appoint an "investigator of accidents" at $5,000 a year, whose duty it shall be to take charge of the investigation of any accidents in connection with the operation of the property, facilities or service of any public service company and make a complete report thereon to the commission. Article II of the law takes up in detail the question of the duties and liabilities of public-service companies, and among the duties mentioned are these: To furnish and maintain service and facilities that are just, reasonably adequate and practically sufficient for the accommodation and safety of its patrons, employees and the public; to furnish such service at just and reasonable rates; to make all repairs, alterations and improvements reasonably necessary; to file with the commission and post and publish tariffs and schedules showing rates and distribution of facilities; to establish, file and publish reasonable and just joint rates; to make no change in any tariff or schedule filed or published except after thirty days' similar notice to the commission and the public, stating the proposed changes, whether increases or decreases, and the date of change; to change no rate or classification theretofor determined by the commission within three years without the approval of the commission after thirty days' prior notice to the public; to file with the commission verified copies of all legal papers and information dealing with their public service; to keep a system of accounts prescribed by the commission, with proper attention to operating and capital entries and a depreciation account (municipally owned utilities being included herewith under this requirement); to account to the commission when required to do so for the disposition of all sales or pledges of stocks, bonds and other evidences of indebtedness; to follow out the orders of the commission as to exchange of street car transfers and through routing and to give immediate notice of any accidents in connection with operation.

The commission, through the enforced requirement of its "certificate of public convenience," is to have power over the original incorporation and any change therein of a domestic corporation, over the exercise of the powers of a foreign corporation within the State, and over selling, assigning, consolidating, merging and all other forms of intercorporate relations.

Furthermore, for any municipal corporation to acquire, construct or begin to operate any plant, equipment or other facilities for the rendering or furnishing to the public of any service of the kind or character already being rendered or furnished by any public service company within the municipality, the certificate of public convenience is required. No contract or agreement between any public service company and any municipal corporation is valid unless approved by the commission, provided that upon notice to the local authorities concerned any public service company may apply to the commission before the consent of the local authorities has been obtained for a declaration by the commission of the terms and conditions upon which it will grant its approval of such contract or agreement, if at all.

When application is made to the commission by a public service company for the determination of the amount to be paid for any franchise privileges or other rights, or the aggregate value of merged or consolidated properties, or the value of any reorganized property, or for a certificate that stocks and bonds have been properly issued, or for the determination of any property or labor for which any bonds or other evidences of indebtedness are issued, the commission is authorized to hold hearings and make a finding in writing, stating the value ascertained and to issue under its seal a "certificate of valuation."

The issuing by the commission of any "certificate of valuation" is deemed only to certify to the fact that securities were issued for money, labor or property actually received and is not to be taken as requiring the commission in any subsequent valuation to ascertain the value of the property of a public utility to fix a valuation which shall be sufficient to yield a return to the holders of the said securities; neither shall the certificate of valuation be deemed to require the commission in subsequently determining the rates to be charged for the service of the company to provide a rate sufficient to yield a return on the said securities.

Every public service company must file with the commission on or prior to the date of issuance of any stocks, bonds, etc, payable at periods of more than twelve months after the date thereof (unless the "certificate of valuation," has been obtained), a "certificate of notification," which must show the total amount of securities thereof, the number and amount thereof outstanding prior to the date of the certificate, the amount retired. the amount undisposed of and whether held in the treasury as a free asset or pledged, the number and amount to be issued and the purpose and contemplated disposal, the number and amount remaining unissued, the par value, the preference or privilege of the securities, the dates of maturity, rates of interest and any conversion rights and the redemption price.

These certificates are to be signed and issued by the treasurer, auditor or controller of the company and are to be deemed public records.

The provisions of the act relative to certificates of valuation and notification do not apply to the issuance of evidences of indebtedness payable in twelve months or less or the pledges of securities to secure such evidences of indebtedness, but if such evidences of indebtedness are refunded by securities running for more than twelve months the certificate provisions apply.

It is declared unlawful for any public utility to capitalize its franchises and privileges in excess of the amount paid to the Commonwealth or to issue any securities for any consolidated or merged company exceeding the aggregate values of the properties so consolidated or merged and any additional sum actually paid in in cash and additional property actually contributed.

A public utility is prohibited from purchasing, acquiring or holding in absolute ownership as a pledge or as a collateral security, directly or indirectly, any controlling right, legal or equitable interest in the capital stock or securities of any other public service company in Pennsylvania without the consent and approval of the commission.

Upon complaint or upon its own motion the commission may examine the rates and service of public utilities and order more just, reasonable, safe and adequate service and rates. It has power to fix maximum rates, set aside discriminatory and preferential rates and practices and order reparation for injuries. In any proposed increase in any rate the burden of proof to show that the increased rate is just and reasonable is on the public-service company.

The commission has power upon application or of its own motion to determine the fair value of a public utility property and can exercise the power when deemed necessary or proper, taking into consideration original cost, improvements, earning capacity under existing rates, market value of securities, obsolescence, reproduction cost based on a fair average price of materials, property and labor, and the development and going value of the property.

Any officer of a public utility who affixes his name to any securities, or any director who consents to their issuance in violation of an order by the commission, is guilty under the act of a misdemeanor punishable by costs and a fine not exceeding $5,000 or five years' imprisonment, or both. The same penalties hold for any officer, director, agent or employee who assents to an application or disposition of securities or the proceeds thereof in violation of the purpose set forth in the "certificate of notification" or makes any false statements to procure such certificate or in any report to the commission. A refusal or neglect to obey any final order of the commission or court or any assistance in such refusal or neglect is punishable by a fine of not more than $500 or by imprisonment for from one to twelve months, or both, and a second offence shall be punished by a fine of not more than $1,000 or by a three to eighteen months imprisonment, or both. Action for the recovery of any penalties or forfeitures and all prosecutions must be brought within three years from the date when the liability arose.

The section of the law concerning the keeping of accounts is important in view of the agitation for municipal ownership. The idea has been prevalent in some quarters that fabulous profits exist in public utility ownership and operation, and this belief has undoubtedly inspired to a great extent the movement in this country for municipal ownership, especially of electric light plants. The Pennsylvania law requires that both privately and municipally owned utilities must keep uniform accounts and render reports to the commission, a provision which should materially aid in making more nearly possible a conclusive comparison of the two methods. The law also, as will be noted, places a desirable restriction on any municipality wishing to furnish its citizens with service already offered by a private utility, in that before so doing it must obtain from the commission a "certificate of public convenience." Thus the commissioners, not the local authorities, are the final judges of the needs of the public, and they have power to protect a private company giving good service, from unregulated competition by municipally operated plants. This provision, while benefiting more directly light and power properties, must operate to protect all investments in public utilities better than before.

The Public Service Commission of Wisconsin has been taken as a good example of such regulating bodies, and an interesting presentation of the manner in which it has secured better franchise conditions, improved service and scientific rates was made by its chairman, Mr. John H. Roemer, at a notable meeting on Association Island, September 4, 1913. Some portions of it may be quoted here as a review of the five years of its administration. Students of economic science, Mr. Roemer said, have for many years been endeavoring to devise a limited franchise which would be adequate during the term thereof to meet the requirements of the public as well as those of the public service corporations, but they have found it impossible to frame a model franchise of any character based upon sound economic principles which could either be limited in time or could prescribe definitely the charges to be exacted or the quality of the service to be rendered during the life of the franchise. If a franchise is to be limited in time, provision must be made for its amortization. This compels the public not only to pay a fair return upon the investment during the life of the franchise but also to provide a sinking fund which, with the scrap value of the plant at the termination of the franchise, is equivalent to the original investment. Others have advised the adoption of franchises for long periods of years, reserving to the municipal councils the right to fix rates and establish standards of service at definite intervals or from time to time at the will of the councils. The general experience under franchises of this character has not been such as to warrant their commendation. The expenditure of large sums of money by some of the larger cities to ascertain all the essential features necessary for intelligent and lawful action on the part of common councils invested with power to establish rates has been more frequently wasted than profitable, as the facts thus acquired have generally been ignored and action taken which was either prompted by prejudice or based upon political consideration.

From an economic standpoint, an unlimited franchise with the provision that the municipality may revoke it at any time upon condition that it acquire the plant by paying to the company the reasonable value thereof, is generally regarded by those who have given the subject exhaustive study and consideration as the best kind of franchise. The necessity of the service in all probability will not terminate with or prior to the time of the expiration of the limited franchise. It must be obvious to all who have given the subject any serious consideration that an indeterminate franchise containing the provision that the rates and services shall at all times be subject to revision by an impartial and independent tribunal will result in the greatest good to the public as well as to the investors in such enterprises. It eliminates all friction between the community served and the agency serving it.

It was with a view of placing public utilities upon a sound economic basis and eliminating all unnecessary friction between the public and such concerns due to causes arising from ignorance of the economic status of public utilities and their moral and legal relations to the public that the Wisconsin public-utilities law was framed and enacted. That public utilities are virtually monopolies by nature and must be dealt with as such in any just and comprehensive system of state regulation is the fundamental economic principle upon which the law was constructed. Without protection of such monopolies only a limited and inadequate supervision of their affairs by public authorities can be morally justified. At the very foundation of the Wisconsin system lies a uniform indeterminate franchise, denominated "an indeterminate permit," which gives the corporation a legally protected monopoly. It can never be deprived of its property unless the municipality determines to acquire it, and then just compensation must be paid.

In the valuation of plants, every element of value, both tangible and intangible, is to be considered in reaching a result, excepting only franchise values, which are necessarily excluded by the general policy of the law. The object to be attained is the fair value of the property as a going concern. This, in the contemplation of the statutes, is the proper capitalization upon which returns must be allowed.

The elements usually available for consideration are the original cost of construction, the amount expended in permanent improvements and extensions, the reproduction cost and the same less depreciation, and the going value. In arriving at a fair and equitable appraisement of the physical structure the commission has considered, as more or less controlling, the reproductive cost based on the average prices of material and labor for the five years immediately preceding the time of appraisement. The results thus attained have been so obviously just and equitable that the municipalities and the utilities generally have acquiesced therein. Nevertheless, for the sake of comparison and illumination of the subject. the reproductive cost based on current prices also is considered. The commission has never confined itself to any one basis to the exclusion of others in reaching a conclusion. Every factor bearing upon the subject is carefully weighed and such importance given to it as the situation in the light of all the circumstances demands. While a form of universal application might be desirable, yet, from the very nature of the undertaking, such is impossible. In the last analysis enlightened judgment and conscience must be applied to the facts in hand if a just determination is to result.

The uniform classification of accounts has now been in effect for over three years. One of the features of these accounts is that it endeavors to serve as a basis for ascertaining the cost of service. Although it is self-evident that no business of the character involved in public utility service can be successfully conducted without an accurate knowledge of the cost of rendering the service in which the utility is engaged, it was surprising to learn that while the best conducted privately owned utilities had in a measure recognized the importance of such information, the majority of the managers of municipal plants had generally been wholly oblivious to the necessity of any such knowledge. This lack of efficiency on the part of the managements of municipal plants has been due partly to various causes, many of them beyond the control of the plant. The first of these is the question of organization and responsibility. A part of the public function or department of city government is frequently administered by a superintendent, board of public works, an engineer, board of commissioners or committee of the common council, and it is frequently difficult to ascertain just where the duties of these individual city officials begin and end. The matter of rotation in office seriously interferes with continued efficient management. Accounts pertaining to municipal plants were often merged with other accounts of municipalities, and even where separation was made, the accounting was so crude and inaccurate it was impossible to ascertain even approximately the cost of any class of service.

The local authorities in control of municipal utilities were at first slow to respond to the demands of the commission, except in the most progressive communities. In some instances it appeared that those in charge of such plants were apprehensive that proper methods of accounting might result in disclosures reflecting upon the capacity or integrity of the management. In other instances there seemed to be no one in the organization of employees capable of keeping a set of books intelligently. This was particularly true where the management changed with the municipal administration. At the present time, practically every utility within the State, whether municipality or privately owned is now keeping its accounts according to the system prescribed by the commission.

To ensure observance of the rules relating to service, the inspectors of the commission are constantly traveling through the State making secret inspections. These rules differ materially from those in vogue in other states and countries. They place the responsibility for the character or the quality of the service primarily upon the utility, which is required to test its own meters and make various other specific tests of the quality of the service prescribed in the rules and regulations, and also to keep a record of the results of all such tests, which must be kept open for public inspection. While the accuracy of meters is an essential element in the economic use of both gas and electricity, the maintenance of adequate pressures is more essential to the efficient use of either. Consequently, general systematic surveys of gas pressures and electric voltages by means of recording instruments are made. The electric inspectors take continuous records of voltage over the distribution systems, calibrate the companies' standard instruments and supervise the testing of consumers' meters and the renewal of incandescent lamps.

When the general survey of the service in Wisconsin was first made it was found that few of the plants were able to comply with the prescribed standards without making alterations and improvements. Hundreds of thousands of dollars were spent by the different utilities in order to bring their equipment to the point where compliance with the rules of service was possible. Many of the managers of the municipal plants were reluctant to make the necessary changes in order to improve the quality of their service.

At the time systematic inspection was undertaken only about fifteen of the 250 electric plants in the State, serving some 15,000 consumers, were giving reasonably satisfactory voltage. In order to comply with the requirements of the rules of service, about forty plants had to be generally overhauled. In the remaining plants it was necessary to install governors, automatic voltage regulators and additional transformers, and also to make extensions and changes in the structure of the plants and distribution systems. Some of this work has not yet been completed, but about 50,000 consumers of electric current out of 75,000 are now receiving satisfactory electric service as measured by the prescribed standard. The state regulation of voltage is new and work similar in scope has never before been attempted. There is as a result of the improvement of service, according to the computation of the engineers of the commission, a money saving of at least $75,000 annually to electric consumers.

Mr. Roemer stated that at the time that administration of the law was first undertaken it was found that there were few public utilities in the State which did not have in effect a large number of "discriminatory" rates. While all had established schedules of rates, the departures from such schedules were numerous. Many thousands of such discriminations were in existence. It was difficult for the utilities, in many instances, to wipe out the discriminations of their own accord. These had often been forced upon the utility by those having more or less influence in the community and who were in a position to harass the utility through the common council and otherwise, unless they were favored as patrons. Such influences were not entirely unlike those which, a few years ago, often compelled railway companies to indulge in similar practices. By a general order, the commission compelled every utility in the State to eliminate discrimination of all kinds and charge in every case the regular schedule rates.

As rates made by the commission are based upon the cost of service, the commission has in each instance where a schedule of rates has been challenged worked out a scientific schedule which classified the services according to the cost. The result of this has been most gratifying. Business has extended and the returns of the public utility increased. As an illustration, one of the largest public service corporations in the State, operating both a gas and an electric plant, valued at approximately $1,000,000, was obliged in a rate case to put into effect a scientific schedule of rates which provided a reduction of the maximum rates theretofore in effect, but so classified the service that the consumers in each class were paying for the services rendered rates based upon the cost of the service to the utility. The company estimated that the new schedule of rates would operate to reduce its net revenue approximately $30,000 per annum. Much to the surprise of the management, the business at once began to develop, and as a result of the expansion within less than two years the management voluntarily applied to the commission for authority to make a further reduction of rates.

In order to facilitate work along lines of establishing scientific schedules of rates, the commission has published the rates, rules and regulations of all the utilities in the State, and by comparison and by the use of hypothetical plans has demonstrated what are reasonable rates, rules and regulations. In a number of cases, small utilities have asked the commission to revise their entire schedule of rates. In fact, utilities often come to the commission asking that a schedule of rates be provided which will develop their business. Probably the larger number of utilities are operating upon schedules which are more or less scientific and based in a measure upon the cost of the various services rendered. It is gratifying to know that such utilities as have established such schedule of rates have been able to extend their business greatly, increase their operating revenues and their net incomes, and reduce the cost of the service to the consumers.

Inquiry is often made, said Mr. Roemer, by those interested in utilities outside of the State of Wisconsin as to the rate of return that is allowed to a utility in Wisconsin. In reply to this it may be said that the commission has never established and does not intend to establish any fixed rate of return.

No regulation can be effective which is not based upon accurate information and which is not actuated by a sense of justice and equity. In the light of the past, it must be conceded that an independent tribunal, free from local influences and prejudices and assisted by a corps of trained experts, is better qualified to regulate efficiently public service corporations and individuals engaged in public services than any municipal council or local tribunal. In few instances would it be possible for municipalities to maintain the necessary organization of competent assistants to deal intelligently with the problems involved in the regulation of public utilities. The cost of such an organization would be prohibitive. In central control there is therefore not only efficiency but also economy. One body can serve all municipalities as well as one municipality and serve them better.

The statement by Mr. Roemer presents the various benefits and advantages of public service commission regulation in a very forcible manner. It is not to be forgotten, however, that as evidenced by it, the element of restriction enters in, and in this respect it is contended by some authorities that public utility service, with some forty regulating bodies "sitting on it," is by no means likely to expand as fast in the future as it has done in the past. Moreover, there is beginning to appear the necessity not only of securing greater uniformity in the rulings of these numerous boards, but even a sufficient and satisfactory record of the vast mass of decisions emanating from them and covering pretty well every subject under the sun. The *Rate Research* bulletin of the National Electric Light Association covers much of this ground in a useful manner, but co-operative measures on behalf of all the various classes of utility affected by such regulation, has been under serious consideration. It may be costly work, but its undertaking seems almost inevitable. Another angle of the subject is given in the address made by Dr. E. B. Rosa, before the National Association of Railway Commissioners of Washington, D. C., last October, when as chief physicist of the United States Bureau of Standards, he spoke of the importance of the co-operation of the Bureau with State public service commissions, many of which were already looking to it for help and advice. He mentioned in particular investigations made by the Bureau as to gas tests and electrolytic corrosion of water and gas pipes and underground cables. Such questions, he said, should be kept out of the courts entirely. In two cities studied by the Bureau as to electrolysis, it was found that the saving of electric energy effected by the methods of mitigation proposed was enough to pay a fair return on the entire cost of the changes and new construction required, and the systems would be in better operating condition for the change. The work was conducted as a scientific investigation, although it was done in a thoroughly practical way and all conclusions verified by frequent reference to working conditions.

Another investigation referred to by Dr. Rosa as of great practical importance recently undertaken is on the life hazard in electrical work. Manufacturers can help by improving the design and construction of certain kinds of apparatus; constructing engineers can help by using better materials in many cases and installing dangerous apparatus with greater thought of the life hazard; operating companies can help by educating their employees and by adopting stricter rules for their protection and providing them with more and better safety appliances; public service commissions and city authorities can help by adopting better regulations and having frequent inspections; the press can help by creating public sentiment in favor of attaching greater value to human life and warning the public of the danger. Operating companies and electrical engineering societies are cordially assisting the Bureau in this investigation, and the Bureau hopes to place some preliminary results in the hands of the public service commissions at an early date. In this connection it is worthy of note that the Bureau is represented on the Accident Prevention Committee of the Association.

Another investigation of practical bearing to the public service commissions is that on the instruments used in electrical measurements and the methods of testing. The traveling inspectors employed by the state commissions render the companies and the public great service by checking up the master meters of the stations. These meters are usually not very portable, and traveling inspectors who are prepared to test them and to give local inspectors information and assistance in their work render an important service.

For the lack of a sufficiently large scientific and engineering staff, the Bureau has been unable to do as much as it would wish and has been unable to give the assistance to some of the state commissions which it has been asked to give and should have been very glad to give if possible. It is hoped that by another year the resources will be greater, and that the Bureau can take up in a thorough and scientific way many other problems connected with the public utilities.

One of the most serious objections that have been urged to the regulation of public utilities by commissions is that if the same rate of return on the capital invested is allowed to all companies it removes in many cases all incentive to the responsible officers of utility companies for enterprise, hard work and economy, and that in consequence both the public and the stockholders are losers, and great injury is done the industries. As yet so little experience with rate-making has been had that one cannot say whether this has already occurred in some degree or not. Nevertheless, this is a tremendously important consideration, and it must not be ignored. Dr. Rosa called attention to the fact that the California Legislature recognized the importance of the matter and provided for it in the public utility act of 1911 in the following paragraph:—

"Nothing in this act shall be taken to prohibit any public utility from itself profiting, to the extent permitted by the commission, from any economies, efficiencies or improvements which it may make, and from distributing by way of dividends or otherwise disposing of the profits to which it may be so entitled, and the commission is authorized to make or permit such arrangement or arrangements with any public utility as it may deem wise and for the purpose of encouraging economies, efficiencies or improvements and securing to the public utility making the same such portion, if any, of the profits thereof as the commission may determine."

The State of Idaho embodied the same paragraph in its recent public utility law, and the still more recent Pennsylvania law expresses the same idea in the following language: "It shall be lawful for every public-service company * * * to participate, to such an extent as may be permitted by the commission and deemed by the commission wise, for the purpose of encouraging economies, efficiencies or improvements in methods or service, in additional profits which may be afforded by such economies, efficiencies or improvements in methods or service."

These are clearly just and wise provisions if they can be realized. But the question at once arises, How shall the public service commission decide whether a given company has made such economies, efficiencies and improvements as to entitle it to additional profits? Standards of efficiency and economy must be set, and a given company claiming to have considerably exceeded the average and asking to be allowed to pay dividends higher than the normal must be judged by such standards. On the other hand, if a company is poorly managed, its performance will show it when measured by the same standards.

Such a system would tend powerfully to promote economy and enterprise, and yield large benefits to the stockholders and the public. It is a flexible and just sliding scale, but to carry it out successfully requires an exceptionally well equipped commission. Its realization would certainly constitute a long step toward the scientific regulation and control of public utilities.

But few state commissions can maintain engineering staffs large enough and able enough to do all that is required to realize such a scheme. If, however, the states could co-operate effectively in this work, so as to utilize their combined resources most efficiently, and with the federal government assisting and co-ordinating the work, it is possible that standards of economy and efficiency could be set and operating data determined that would be of infinite service not only in enabling the commissions to act more intelligently and more justly, but also in securing greater uniformity of action among the various commissions. The Bureau, Dr. Rosa said, hopes to be in position soon to do something in this direction.

The relation of the Bureau of Standards to the public service commissions is unlike that of the Interstate Commerce Commission in some respects and like it in others. It is like it in representing the federal government and in co-operating with the state commissions and striving to bring the latter close together. But it has no legal authority over the utilities, holds no hearings of complaints and renders no binding decisions. Its work is primarily scientific investigation, some of which is theoretical and refined (such as fixing of primary standards and methods of measurement) and some is very practical and concrete, and includes many of the most interesting problems of present day engineering. Dr. Rosa believed that there is an immense opportunity for usefulness in assisting to solve some of the problems presented by the public utilities, co-operating in this work with the state commissions and assisting them as far as possible to get full and reliable information, but not assuming any responsibility that belongs to them nor interfering in the slightest degree with their freedom of action.

To present a review of all the rulings and decisions as to our industry, made by public service commissions during the year would be literally impossible here. It would require volumes rather than "a folio of four pages," and has already been done in a most commendable and useful manner in *Rate Research*. But there are always a few matters that stand out, or appeal for special recognition, and some of these are now noted. To the Progress Committee it seems that it is at least significant that one of the newest and latest commissions, that of Pennsylvania, within whose hospitable borders we are now convened, has taken its stand with regard to the principle of monopoly in public service in two cases that have already come before it. In so doing it takes the same position that most of the other commissions hold on this question; namely, that it is unwise to permit two companies to do in competition what one existing company, serving a territory, is able to do. The grounds on which such a policy is defensible are reasonable and economic. The history of public utility companies in various parts of the country proves the case. Generally a competing plant is absorbed by the existing company whose rates it demoralized and whose business it tried to get. A part of the public has been so short-sighted in the past as to see only the immediate temporary lower rates which the competitor promised, and to fail to recognize that a consolidation was inevitable after an uneconomic rate war had demoralized the business. After such a consolidation there are two plants and two capital accounts upon which the public, directly or indirectly, has to pay a return. The theory of regulation by the public is that the monopoly furnishing the service shall be protected from destructive competition. The companies, on their part, are not without obligations when they accept this theory. They owe it to the public to give better service while enjoying protection as a monopoly than they would give if they were under the spur of competition.

In these two decisions the commission of Pennsylvania has declined to grant authority to companies to enter territory already served by existing public utilities. The petitions for authority to compete which were denied were those of the Schuylkill Light, Heat & Power Co., which desired to enter the borough of Ashland, already served by the Eastern Pennsylvania Light, Heat & Power Co., and of the Harmony Electric Co., which wanted to compete in Ellwood City with the Pennsylvania Power Co. The commission said: "Long experience has shown that while the temporary effect of competition between public utilities occupying the same territory is to secure lower rates, the final result is likely to be the absorption of one utility by the other and then an increase of rates to pay the expenses of the warfare.

"Vested rights and interests must be duly conserved and protected. The commission has no warrant to invite or permit limited competition anywhere unless the area and population served, the needs of the community or the prospects of the municipality, as based on its growth and development, can reasonably show that the public welfare demands it. This principle of protection must be extended to the public utility to the end that the individual citizens who have invested in its plant equipment in good faith may be duly protected in their interests."

One of the most vital events of the year has been the passing of an ordinance by the city council of Cleveland, Ohio, fixing a maximum rate for electricity of 3 cents per kilowatt-hour. It would be a long story to tell how an arbitrary figure like three cents was fixed upon as to central-station service rather than loaves of bread or tons of coal; but we have to take these things as we find them or as they hit us. A very clean cut statement of the matter is found in the appeal against the ordinance made by Mr. Samuel Scovil, president of the Cleveland Electric Illuminating Co., and which is here quoted:—

"The fact that the city is a competitor, actively engaged in soliciting business from the public which this company serves, in equity disbars it from fixing the terms upon which its competitor may do business.

"Under the laws of Ohio the State Public Utilities Commission has practically unlimited power to appraise the property and investigate the business of any public service corporation for the purpose of establishing just and equitable rates. These laws have been in force three years. At any time during that period the rates of the illuminating company have been subject to regulation and adjustment, if, upon investigation by this expert public body, they were found to be unreasonable. Instead, however of appealing to the commission for an expert and impartial adjustment of rates, the city elected to engage in competition and has authorized the issue of bonds for that purpose to the amount of $2,500,000. These bonds are issued on the faith and credit of the people and are payable both as to principal and interest by taxes levied on the property of non-users as well as users of electricity.

"The ordinance fixing 3 cents as the maximum price for electric light was passed by the Council without any investigation, expert or otherwise, as to whether it is a reasonable and proper rate. The new $2,500,000 municipal plant is not yet completed and therefore no data to justify the 3-cent rate could have been obtained from that source, while the city's experience with its lighting plants in Brooklyn and Collinwood does not furnish a reasonable basis for a rate of 3 cents for residence lighting.

"The illuminating company pays annually large sums for the privilege of doing business under the laws of Ohio and the ordinances of Cleveland, and for such protection to its property and business as those laws and ordinances afford. Last year these payments amounted to $303,743 and for the current year they will exceed $350,000. It will cheerfully abide by any just and equitable rate or service regulation which may be fixed after due consideration by the legally constituted authorities as provided by these laws."

The Cleveland company is conservatively capitalized and well managed, has low rates and a modern efficient plant, and operates under a progressive business policy. It seems simply impossible that such an edict as it is contending against can possibly have any recognition, unless some of the fundamental principles of economics, industry and civilization in general are torn up by the roots and thrown away.

One of the most interesting and extraordinary examples of the extent to which commission control may be carried was furnished by the action of the Public Service Commission of Missouri, which went so far as to assert and insist that it had the power to remove officials or employees of a company under its jurisdiction. Nothing more fantastic and dangerous than the application of such a principle could well be imagined, and if there is anything in any act creating public service commissions which goes that far in "sumptuary legislation" it has certainly escaped the eyes of the Committee on Progress. In the case under notice, the commission rescinded its order directing the company to remove its manager. This would indeed seem to be the only way out, especially as it is shown by the testimony that the manager owned or controlled the larger part of the property. One might imagine that something very wicked and desperately vicious had been the inciting cause, but "the fact could not be overlooked that the offending was not the result of bad faith or dishonesty, but rather of bad judgment and a failure to understand the character and spirit of the people with whom the company dealt." It seems superfluous to offer comment which every reasonable man can supply for himself.

One of the most interesting developments has been the step taken in various states by the commissions to deal in varying ways with the subject of meters. Both the Public Policy Committee and the Meter Committee have had their attention called, and their help invited, in regard to regulation or legislation in different states on this subject. To illustrate how far-reaching such rules are the revision of October 9, 1913, of those of the Wisconsin Commission may be quoted, as they set a standard followed quite generally throughout the country. In the modifications as to electric service, the rule which limits the error of any meter to 4 per cent on light load, half load or full load has been changed to include any load between one-tenth and full load. No attempt was made to define average accuracy of watt-hour meters, since it was recognized that this varies with conditions to such an extent that it is better practice to take this into account in adjusting bills for incorrect meters. Instead of merely requiring each meter to be tested and adjusted for accuracy at the time of its installation, the new rule provides that "each watt-hour meter shall be checked for current connection, mechanical conditions, suitable location and accuracy of measurement at approximately three-quarters and one-tenth connected load, by comparing the meter with approved standards in its permanent position in place of service within thirty days after installation." Meters operating at low power-factor must also be tested at approximately the minimum power-factor under which they will be required to operate. Meters installed with instrument transformers or shunts must be tested jointly with the transformers or shunts, otherwise the transformation of the transformers or calibration of the shunts must be determined at least once every five years. The rule providing for the testing of each meter at least once a year has been abandoned, and henceforth all meters requiring periodic tests must be tested according to the following schedule and under the conditions prescribed above:

"Single-phase induction-type meters having current capacities not exceeding 50 amperes shall be tested at least once every two years and as much oftener as the results obtained shall warrant.

"All single-phase induction-type meters having current capacities exceeding 50 amperes and all polyphase and commutator-type meters having voltage ratings not exceedings 250 volts and current capacities not exceeding 50 amperes shall be tested at least once every year.

"All other watt-hour meters shall be tested at least once every six months.

"In no case shall commutator-type meters having heavy moving elements and sapphire jewels be allowed to make more than 1,000,000 revolutions between tests. Where meters are found to register considerably in error when tested on the above schedule, the commission reserves the right to order the particular meter or class of meters tested more frequently."

Each electric utility is required to own suitable working standards for the testing of meters, and these standards must be correct within 0.5 per cent or proper corrections applied.

Considerable difficulty has been experienced by the commission, owing to the absence of complete station records, and the following new rule has been added: "Each utility furnishing electric service shall keep a record of the time of starting and shutting down power-station equipment and feeders, together with the indication of the principal switchboard instruments at sufficiently frequent intervals to show the characteristics of the load, and shall maintain a record of all interruptions of service upon the entire system or major divisions of its system and include in such record time, duration and cause of each interruption." An interruption is defined as a period of over thirty seconds during which the voltage on the circuit is less than 80 per cent of its normal value.

The old ruling covering the pressure variation has been left intact in so far as it applies to utilities operating in cities of less than 1500 population. In cities of over 1500 the new rules provide that the utilities shall adopt a standard voltage for the entire constant potential system, and shall maintain the voltage within 3 per cent of such standard on all lighting circuits during lighting hours; on motor circuits and during other than lighting hours the voltage shall be maintained within 10 per cent of the standard. To insure compliance with the above rule without the necessity on the part of the commission's staff of making practically all the voltage surveys, a rule has been added which requires the utilities to make a sufficient number of voltage surveys to indicate the service furnished from each transformer and feeder. Utilities serving more than 250 consumers are required to own and to keep in constant service at least one portable graphic recording voltmeter.

In discussing these rules before the Wisconsin Electrical Association last January, Mr. F. A. Vaughn, member of the N. E. L. A. Meter Committee in a general discussion of the subject, pointed out that the commission for the Second District of New York had made a ruling which unintentionally precluded the possibility of ever using an ampere-hour meter in that district for the measurement of energy. The commission had indicated more recently that it did not intend to make such a broad ruling. On this point Mr. Vaughn said: "This last error is a serious one in view of recent developments in ampere-hour meters here and abroad and the thorough discussion that is going on in the National Association's committee on meters, as well as the interested attitude of the Wisconsin commission in the possible use of the ampere-hour meter for a large number of places where an inexpensive meter is desirable and probably practicable." The subject may well be left here with the following appendix, which would indicate that even energetic commissions realize it is well to go "slowly": "In the original draft of rules for electric service of the Railroad Commission of Wisconsin there was one—tentative Rule 28—intended to provide that maximum-demand instruments or indicators should be tested in as careful a manner as would be required for a watt-hour meter for an installation of the same size. The Wisconsin committee saw that no demand indicators on the market could be adjusted to comply with this rule. A promise to make strenuous attempts to standardize the practice and develop better meters through the manufacturers caused the commission to strike out, for the time being, tentative Rule 28 and withhold further rulings on maximum-demand indicators for approximately one year, when the various committees on meters will be able to report the progress of development. The National Electric Light Association has undertaken an exhaustive investigation of the characteristics of maximum-demand meters. When this work is completed and practice becomes more uniform and meters are developed capable of performing certain functions under given conditions, it may be safe to frame a substitute for tentative Rule 28."

The Report of the Meter Committee this year, a most valuable document, includes a tabulation of all public service requirements, or the absence of them, as to meters.

MUNICIPAL OWNERSHIP

In connection with its work of reporting on the central-station industry, the United States Bureau of the Census has furnished the accompanying table for the municipal plants of the country in 1912.

MUNICIPAL ELECTRIC LIGHT PLANTS OF THE UNITED STATES

	1912	1907	1902	Per Cent of Increase; 1902-1912
Number of stations	1,562	1,252	815	91.7
Income	$23,218,989	$14,011,999	$6,965,105	233.4
Electric service (light, heat and power, including fire service)	$22,663,708	$13,614,434	$6,836,856	231.5
All other sources	$555,281	$397,565	$128,249	333.0
Total expenses including salaries and wages ...	$16,917,165	$10,316,620	$5,245,987	222.5
Total number of persons employed	7,940	5,566	3,417	132.4
Total horse-power	559,328	321,351	160,028	249.5
Steam and gas engines (including turbines):				
Number	2,307	1,792	1,078	114.0
Horse-power	429,067	289,500	147,975	190.0
Water-wheels				
Number	269	153	82	328.0
Horse-power	130,261	30,347	11,218	1,061.2
Auxiliary engines:				
Number	*	72	36	.....
Horse-power	*	1,504	835	.....
Kw rating of dynamos.	368,677	209,016	113,380	225.2
Output of stations, kw-hr	537,526,730	289,462,788	195,904,439	174.4
Estimated number of lamps wired for service:				
Arc	91,851	†82,940	50,795	80.8
All other varieties ..	7,057,849	†4,061,318	$1,577,451	347.4
Stationary motors served:				
Number	21,895	4,507	1,962	1,016.0
Horse-power	164,291	31,689	3,324	4,842.6

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*Not reported separately

†Includes, for purposes of comparison, 595 arc and 28,579 incandescent lamps reported by the plants to light their own installations. Lamps used for such service were included in the total number reported in 1912

As a rule, no cash income is derived by municipal stations for electrical energy used for lighting streets and public buildings. In order that the income shown may approximate the total consumption and sale of electrical energy by the stations, the census schedule required that the income for service of this character should be estimated on the basis of what would have been charged for similar service by commercial companies in nearby localities. The number of persons employed may fall short of the total number actually engaged in work in connection with the operation of the electric stations, because employees for the electrical work often are not required for long or continued service, and they are reported with that branch of municipal work with which they are chiefly employed.

It will be noted that in every respect, the municipal plants of the country cut a very small figure as part of the great central-station industry. This can be seen by comparing the table with that which applies to the industry as a whole. The main point, perhaps, is that while the income of all these plants was about $23,000,000, the income of the industry was not less than $302,000,000, so that municipal plants at the best were doing a business of less than 8 per cent of the whole. Such plants are usually started in small places where there has been no inducement offered to private capital, but now, with our "far-flung" transmission circuits, many of the plants have gone out of business or have been glad to take their supply of electrical energy at lowest cost from the private lines. In the meantime it is a matter of record, which any one can check up, that no fewer than 211 municipal lighting plants of one kind or another have been abandoned. In an interesting discussion of the whole subject before the Finance Forum of the Young Men's Christian Association of New York, last March, Mr. Arthur Williams picked out one specific case and said:—

"Notwithstanding the long list of municipal ownership operations abandoned or creating annual deficits, it has seemed that these are the least important of the disadvantages to which the municipality is subjected in undertakings of this kind. As bearing upon this point, take as a concrete example the municipal lighting plant of the city of South Norwalk, Conn. Here we have an enterprise conducted through a long series of years by an upright, able and unselfish group of citizens, who in turn have given united and enlightened support to management as capable and well informed and as free from political influences as can be found anywhere. It is probably the best example of municipal ownership in existence. Nevertheless, without reference to relative costs, profits or deficits, in the attendant circumstances the operation of this plant has undoubtedly been an economic and civic error.

"For many years the city has been in natural line for large industrial development and growth in population. These call for a kind of expenditure in public improvements for which capital of a private nature cannot be secured. Yet a large part of the financial resources of the city has been tied up in this electrical undertaking; to this has been added the unselfish activities of some of her most prominent citizens. Capital in money and human effort have been locked up in an undertaking which could have been at least equally well provided for and conducted by private agencies, and consequently a more general civic development has been retarded.

"The city claims a plant valued at about $200,000, which has cost it nothing. Even so (overlooking the evident fallacy of the statement), it has cost the taking of an intelligent interest from other civic matters which, if released, could have been devoted to purposes which would have made the city famed for more than its possession of an electric light plant, in itself no different from the possession of any other municipality with which South Norwalk must constantly compete for an increase of citizenship and the enhancement of her industries.

"Take a single item from the recent annual report, the statement that for a period of at least two years there has been a repression of any extension of the plant or distributing system, to the disadvantages of her citizens. Does this not mean an inertness of the large amount of capital which expended, in addition to rendering a needed service, would have enhanced to that extent the industrial activities of the municipality? In 1912 this municipality spent $3,000 for improvements, compared with a private corporation expenditure of $50,000 for extending and improving the electric light service in a nearby city of hardly twice the population.

"Practically it would seem that in South Norwalk the real enemies of the municipality were its own citizens, conducting this closely restricted electrical enterprise, and that the friend of the people was the nearby private corporation providing a widespread and adequate service and a local industrial activity within the year of $50,000.

"Contention has been made that the municipal plant gave a cheaper service than had the supply been from a private corporation. Yet the public lighting under municipal ownership was accomplished at a per capita cost of 75 cents, while the cost in the neighboring city to which reference has been made was 50 cents per capita.

"South Norwalk lies upon the main line of a great railroad system. It is but a comparatively short distance from New York. It has the further advantage of being on tidewater, with good docking facilities. It could have been and can still be made a great industrial center. Clearly, it possesses all the essential elements of a great municipality, even greater than Bridgeport, New Haven or Hartford, and yet with all of these natural advantages its present population is relatively most limited. Does this not suggest that something has been left undone, and that the advantages of possessing a plant locally valued at $200,000, fade into insignificance in comparison with the unutilized opportunities which the same character of activities in other directions would have brought to this locality.

"Had the same efforts been expended in advertising the city's natural advantages, in promoting local industries and commerce and in providing adequate terminals and dockage, any advantage claimed from the operation of this plant would be far exceeded. Look at the matter from another angle, which also involves seemingly some fundamental principles. Suppose 'outsiders' had been permitted to invest their money in the plant and to make a fair profit upon it, what would have been the result? Having their capital invested locally, would they not have been interested in bringing other industries to the city, with great mutual advantage, Is it not natural that possessing property there, every effort would be exerted by them to increase the material prosperity of that community, Could investors in public utilities of competitive cities be expected to place their business in a city where they possessed no attendant interests?"

On account of the fact that the estimate prepared by the city engineers for a municipal electric lighting plant at Camden,

N. J., showed the cost of erection to exceed $500,000, while the original estimate was less than $200,000 when the citizens voted in favor of a municipal plant in 1906, the City Council called a meeting of the citizens on July 31, 1913, in order to determine the prevailing sentiment concerning the proposition. As a result of this meeting the Council voted not to authorize the erection of the plant at present.

Opposition to the proposed municipal plant was led by the Camden Board of Trade, which had made a special investigation of a large number of municipal plants throughout the country. In its communication to the citizens the Board of Trade stated that it had failed to find any municipal plant giving satisfaction to the people, but, on the other hand, had found them greatly overmanned, usually for political reasons, and heavy tax burdens on the people, and it argued that this would prove true in Camden should such a plant be built.

The committee of the Board of Trade having the investigation in charge opposed the scheme because it would increase the taxes very materially, the burden of which the business man would have to pay. The board opposed the city plant also because there had been a reduction of $29.50 per lamp since the vote was taken seven years ago and according to a schedule issued in 1912 this amount could be further reduced. A report issued by the Board of Trade demonstrated that the city could purchase street lighting for $33,780 less than it could operate a plant exclusively for this purpose, according to the city's own experts.

The most effective argument against the proposed plant was presented by Mr. Frederick A. Finkeldey, chairman of the municipal electric light committee, whose opposition to a municipal plant was based on the impossibility of divorcing its management from politics. He asked the councilmen if they believed that the various city departments were as well managed as their own individual businesses, and stated emphatically that city employees selected under political influence could not possibly operate a plant requiring engineering training and experience so well as it can be operated by a private company that selects and promotes its employees solely on merit. The object in agitating the subject—namely, to obtain a suitable reduction in the charges for lighting service—having been accomplished, Mr. Finkledey urged the councilmen to cast their votes against the municipal plant. The ordinance appropriating $540,000 for the municipal electric lighting plant was thereupon rejected.

A proposal that bonds to the amount of $200,000 be issued to provide for a municipal electric light plant was defeated by the voters of Sandusky, Ohio, at a special election on July 30, 1913. The Sandusky Gas & Electric Co., under the direction of vice-president C. B. Wilcox, made a campaign against the proposed bond issue, and its arguments prevailed with the electorate. The rates for lighting in Sandusky were 8 cents primary and 5 cents secondary. A new ordinance proposed by the city provided for 5 cents primary and 3 cents secondary for lighting which the company refused to accept, and appealed to the Public Service Commission of Ohio. Certain elements in the city administration retaliated by the municipal ownership proposition, which the citizens voted down.

At a largely attended town meeting at Wakefield, Mass., November 17, the citizens voted to discontinue electrical production at the local municipal lighting plant and to purchase energy from an outside source for a trial period of one year. The local lighting board announced at the meeting that outside energy could be secured at one-half the cost of operating the existing station. It was suggested that a reduction in rates from the present 15-cent to a 10-cent maximum would be possible under the new management. At the meeting the fact was also brought out that municipal operation had cost the town about $240,000 more for street and commercial lighting than would have been the case had energy been secured at rates prevailing in the vicinity.

These would seem to be typical cases, offsetting the discouragement that might be caused by happenings in other quarters.

SOME FEATURES OF ENGINEERING WORK

Although more and more emphasis is placed on salesmanship, and rates, and economic problems in these modern days of huge investment, the engineering problems are also still with us, and never required greater ability and skill than to-day. Not only has electrical energy to be generated at the lowest possible cost, but it has to be supplied continuously over an ever-increasing territory at uniform voltage. Some incidental figures in regard to the distribution work of the Commonwealth Edison Co. of Chicago are illuminating as to what responsibilities are thus involved and what must necessarily be going on all the time. Last year, for example, service connections had to be made at an average rate of two per hour, night and day. Poles were set at the rate of 9000 per year, and line transformer rating increased about 13,000 kw, while. of course underground construction, power-plant and substation equipment expanded with corresponding rapidity. For the past five years the engineering department has had to handle about 1,500,000 lb of copper annually in paper-insulated, lead-covered cable. A hundred thousand feet of miscellaneous standard sizes of such cable are often kept in stock. The overhead circuits consist of 20,000-volt, 60-cycle, 12,000-volt, 60-cycle. 9000-volt, 25-cycle, and a large amount of 4000-volt, 4-wire, 3-phase distribution circuits. More than 3000 miles of wire has been erected for the overhead service. Then there are forty-eight substations to be operated, with 184,000 kw in equipment of miscellaneous apparatus, including twenty-three sets of storage batteries. The complete operation, maintenance and management of these substations with the accompanying necessity of united working is a problem of the gravest character, for the conditions are vastly more severe than if these forty-eight were separate central stations scattered over three or four states. Such magnitudes are involved in the every-day working of the Commonwealth Edison Co., without any reference to its testing laboratories, its load dispatching "nerve center" and other vital elements that lie altogether outside the "firing line" commercial department.

The year did not witness the addition of many new large central stations. It was not a time for, or the culmination of, development, but there will again be periods when enterprise will be encouraged and fostered. and when our industry will illustrate the perfection thus far attained in the electrical and mechanical arts. The new station of the United Electric Light & Power Co., at 201st Street, New York, on the Harlem River, started early this year, emphasizes and exemplifies all that is latest and best in central-station design and construction; while a total investment of $6,000,000 is the best possible evidence of willingness and "readiness" to serve on the part of the capital enlisted in this historic old alternating-current system. Last year it disposed of as much electrical energy as was generated by all of the electric light stations of Rhode Island the year before. The company has with much foresight located its station at a strategic point, for the city is constantly growing in its direction, and sites along the Harlem River waterfront are scarce. Abundant water for condensing purposes is at hand in the river. The stream being also navigable, shipments of coal by boat can be received at all seasons of the year and at all stages of the tide. Considering all the natural advantages and the types of the units installed, the station from an operating viewpoint should not only be exceptionally easy to handle, but very efficient as well.

As in the other stations in New York City the great aim has been to provide for any blow-out, short circuit or other accident in such a manner that the rest of the system, not directly affected, should not be tied up. To accomplish this result, all feeders, connections, leads, busses, etc, have been thoroughly insulated and isolated, so that trouble on one line cannot be communicated to another and thus interfere with continuity of service.

Among the noticeable feaures in the new station is its small boiler equipment compared to that in the New York Edison Waterside Station No. 2. Each station is rated at 120,000 kw, and yet the 201st Street station of the United Electric Co. has only thirty-two boilers while the New York Edison station has ninety-six. This great difference in steaming capacity is due primarily to the use of bituminous coal and also to the better water rates of the turbines and auxiliary steam equipment. The Waterside boilers were designed to burn No. 3 buckwheat coal, which was hand-fired; but the increasing price of low-grade anthracite has compelled the adoption of bituminous coal and stokers there as well, so that not all of the ninety-six boilers are now needed. The installation of horizontal turbines instead of vertical machines was to be expected in view of their size and in the light of recent design, and it is worthy of note that whereas the vertical turbines in the Waterside station operate at a speed of 750 r p m, the horizontal turbines in the 201st Street station have a speed of 1800 r p m. The water rate of the latter is also less by almost three pounds. The placing of the feed-water pumps in the basement of the turbine room with the turbine auxiliary equipment instead of in the boiler room, coupled with the extra room allotted to the apparatus, will no doubt show its effect in the saving of labor thus made possible. A few details may now be given as to this "latest word" in central design and construction.

The United Company's plant is laid out to accommodate all the boiler and generating equipment which it is expected will be needed in the next ten years. In 1913 the United Company produced and purchased 62,656,409 kw-hr of energy, and that distributed to its consumers exceeded by 34.7 per cent the energy distributed during the previous year. During 1913 there was a general increase in the 60-cycle load in all sections of the United Company's territory. It is interesting to note that in 1909 the ratio of energy demand to the total was 45.86 per cent south of Fifty-ninth Street, 21.49 per cent from 59th Street to 135th Street and 32.65 per cent north of 135th Street, while in 1913 the ratios in these districts were respectively 32.66 per cent, 20.22 per cent and 47.12 per cent, showing that the majority of the energy demanded has shifted northward. The section north of 135th Street on Manhattan Island is supplied exclusively from the mains of the United Company, and all the important electrical development in the northern section has been along the lines of 60-cycle supply.

One of the main features in the 201st Street station is the almost universal use of turbine-driven auxiliaries, no reciprocating engines being employed except for hoisting coal and circulating lubricating oil. Relatively high-speed main generating units are installed, each being equipped with a blower driven by two motors, one acting as an emergency reserve. Duplicate high-tension busses divided into four sections are employed, which can be connected in two loops through bus-tie switches and reactors. The 7500-volt induction motor-driven exciters also charge the storage battery and will deliver 250 volts to 350 volts direct current, thus making it unnecessary to operate a booster generator. The storage-battery end-cell switch is operated automatically by a specially designed remote-control switch which shows when the end-cell switch is operating and indicates the number of cells in series. Elaborate coal and ash handling apparatus is installed and the mammoth coal bunkers located just below the roof are designed to prevent spontaneous combustion.

The station, which is of absolute fireproof construction with an exterior of red brick, artificial granite and terra cotta, occupies about 62,220 sq ft of space at 201st Street, where the Harlem River joins Sherman Creek. It is divided into three sections and is about seven stories high. The high-tension bus and switching gallaries are at the west end of the building, the turbo-generators and auxiliaries in the adjoining section, and the boilers, coal and ash handling apparatus at the east end of the station. The building rests on 6600 piles driven to rock bottom.

The walls of the engine room, corridors and office space are faced with white enameled tiles, and the floors are of granolithic concrete set in cast-iron panels. In the boiler room the walls are made of salt-glazed brick to prevent the dust collecting on them and to facilitate cleaning. From the ground floor to the roof of the boiler room there is no obstruction to ventilation, as grating has been employed for flooring on the several landings. This construction prevents dirt accumulating and at the same time provides a light, airy and cool boiler room. Every part of the building is well lighted either through skylights or wall windows. The engine room is especially bright, having a mammoth window at each end and a large wire-glass skylight in the monitor. All window sashes are operated by a compressed-air system. Artificial illumination in the engine room is provided by thirty 500-watt tungsten lamps supported from ornamental wall brackets 45 ft above the floor. Electric illumination in the other parts of the building is afforded by smaller units supported either from the walls or ceiling by rigid pendent fixtures. All doors and windows are constructed of metal. One passenger elevator installed in the west end of the building serves the galleries and office, while three others carry freight.

Coal is delivered by boat to the Harlem River side of the building and is hoisted 184 ft by 1.5 ton grab buckets to the top of a steel coal tower, where it is dumped into hoppers and passed through crushers. From the crusher the coal is conveyed in 3-ton cars, operated by an endless-cable system, to the 15.000-ton concrete coal bunkers located just below the roof of the boiler room. The coal hoists (one in each tower) are operated by one-man-control reciprocating engines. Three hundred tons of coal can be unloaded per hour when hoisting the buckets at 1200 ft per minute. The crusher and endless cable operating the coal cars are driven by induction motors controlled by the men who fill the cars and weigh them.

The 15,000-ton bunkers occupy the entire width and length of the upper part of the boiler room, and their walls have been constructed with sufficient slope to prevent coal accumulating in the pockets and causing spontaneous combustion.

While space has been provided for a double-deck arrangement of seventy-two boilers, only thirty-two 650-hp tubular boilers have been installed. This is all that will be required even with eight 19,000-kv-a turbo-generators operating, as the United Co., contemplates forcing the boilers when the eight generators are installed. When the energy demand exceeds the output of the eight 19,000-kv-a generators, higher rated generators will be installed and the second deck of boilers erected. The boilers now in place are arranged in four rows of eight each, with indicating and recording steam-flow meters in each header connecting a row of boilers with the main header. Besides the usual brick setting each boiler is provided with an additional heat insulation of asbestos board and magnesia and a sheet-steel casing. The boilers are set especially high (10 ft above the floor) to provide sufficient combustion space when they are overloaded. A steam pressure of 200 lb is maintained ordinarily and the temperature of the steam is raised 125 deg. fahr. by superheaters, each having 750 sq ft of heating surface. Underfeed stokers are employed, the coal being delivered to their hoppers through elliptical-shaped downtakes communicating with the 15,000-ton bunkers located above.

The stokers are operated in groups of four by constant-speed induction motors and are connected by inclosed-chain drive to their respective group-drive shafts beneath the floor. Each shaft in turn is driven through an inclosed silent chain by a 30-hp motor, thus requiring eight motors for the present boiler installation. Each of these motors has sufficient power to drive all stokers in one row. In emergency this can be done by closing a clutch which connects the ends of the adjoining shafts. While each stoker is capable of feeding about 6000 lb of coal per hour, only 2500 lb of coal is normally fired per hour, the boilers operating with a gas speed of 10.6 ft per second in the flues. On a boiler in each section is installed an electric tachometer indicating the speed of the stoker-driving mechanism. On this instrument is a movable scale of air pressures below the fire, giving the proper relation between this pressure and the stoker speed. Apparatus is also installed so that an analysis can be made of the flue gas from each boiler.

The draft over the fires is maintained partly by 300-ft stacks, of which there are four (one to each set of boilers), and partly by air pressure beneath the grates. The stacks are constructed of steel, lined with hard red brick, the intervening space being filled with cement. Sufficient pressure is maintained beneath the grates just to overbalance that above, thus preventing any leakage of cold air through the boiler settings or smoke ducts.

While designed to accommodate eight 19,000-kv-a horizontal turbo-generators, the turbine room now contains only three 3-phase, 60-cycle units. These are horizontal double-flow machines and will develop 7500 volts when operated at 1875 r p m. With a steam pressure of 185 lb, a superheat of 125 degrees fahr. and a 28.5-in vacuum, the turbines will develop a maximum of 22,500 brake-hp. The turbines are arranged in a single row with their longitudinal axes parallel and are supported on plate girders resting on steel columns. Each turbo-unit has an over-all measurement of 41 ft by 14 ft by 9.5 ft. Below them in the basement are arranged in units the condensers, auxiliary pumps and motor-driven blowers. Two-pass surface condensers are employed having 20,000 sq ft of cooling surface. They are supported on steel girder platforms directly below the turbines, so there is no friction loss in exhaust piping.

Condensing water is conveyed to the building from the Harlem River through a 83-sq ft suction tunnel which connects with a cross-tunnel extending the length of the auxiliary room floor. An 89-sq ft discharge tunnel superposed upon the latter empties into Sherman Creek.

Water from the suction tunnel is forced through each condenser by a turbine-driven centrifugal pump at a maximum speed of 1000 rpm connected to a variable speed turbine through a 3-to-1 double helical floating frame gear. Gear reduction is employed so that the pumps and turbines will operate at their highest efficiency, and the economy afforded by its use has warranted its installation. The turbo-gear drive is a feature throughout the station, there being fifteen such outfits. Each circulating pump is capable of delivering 24,000 gal. per minute, so that when the ultimate equipment of eight turbines and auxiliaries is installed the pumps will be able to deliver over 103,000,000 gal. per day. The air pumps are of the rotary-turbine type directly connected to 75-hp turbines running at 3500 r p m. Horizontal single-stage, double-suction centrifugal pumps directly connected to 15-hp turbines are used to deliver water from the hot-wells to the feed-water heaters.

Each turbine has its individual oil circulating system. When starting up a turbine, a small reciprocating engine starts the oil circulation, which is normally maintained by a centrifugal pump geared to the turbine shaft, when the latter is running at full speed.

All control and switching apparatus is installed in the west section of the station. The high-tension remote-control and main generator control boards are placed on the third gallery in a room overlooking the engine room. Both switchboards are semi-circular in plan, the high-tension board consisting of two concentric semi-circular sets of boards with conduit space in between. On the larger radius board are mounted watt-hour meters connected to all generator and feeder circuits. Switches are also located on these boards which permit of testing any meter, series or shunt transformer without erecting special apparatus. Installed in this room are also static detectors employed to indicate grounds on any one of the four high-tension bus sections, and indicators to show the particular feeder circuit grounded. An elaborate signaling device is installed for transmitting orders to the boiler room and for governing the movements of turbine operators. The signal installed in the boiler room is of the cariage-call type and indicates the number of boilers which will be required to carry the load. The indicator control device records automatically on a tape the signal transmitted, the time it is sent, and the time it is acknowledged. Another board containing pilot lamps also shows the position of all oil switches (open or closed) in the station. A similar board connected with it gives the same information to the load dispatcher at Waterside station with which the station is "tied in" by no fewer than four circuits following different routes.

The high-tension bus and switch compartments are distributed over the floors of the electrical galleries, of which there are seven. On the sixth gallery are located the bus-tie switches and air-cooled, porcelain-clad "pancake" reactors connected in series with them, designed to carry 2000 amp and have a reactance of 18 per cent. The coils are supported on porcelain insulators resting on concrete bases, and all the metal bracing of bus compartments used in conjunction with the coils is made of brass to prevent magnetic leakage. Short-circuiting switches are installed in compartments near each reactor to shunt the coils in case they are out of order.

Main and auxiliary high-tension busses, each of which consists of four copper strips in parallel, are in compartments on the fifth floor. These busses are divided into four sections and can be connected in two loops through the bus-tie switches and reactors on the floor above. Each bus section is fed by two generators through oil disconnecting switches installed on the third gallery with the feeder switches.

The bus and oil-switch compartments are built of red brick, each phase of a circuit being separated by alberene barriers. Removable alberene floor panels are installed in front of each high-tension compartment to facilitate the pulling of cables.

In the second gallery are located the shunt and series instrument transformers connected to each feeder and generator circuit. Separate transformers are used to operate instruments and relays, the series transformers being arranged in one row of compartments and the shunt transformers in an adjoining row separated only by a brick partition. In the compartments on this floor there are also special series transformers which are clamped around the 3-phase, 3-conductor feeder cables. When a feeder circuit is unbalanced, the vector sum of the currents is no longer zero, and the transformer operates a relay in the high-tension switching room indicating the unbalanced condition. Selector switches are installed on the fourth floor to connect the feeder and generator switches to either the main or the auxiliary bus. The feeder-switch relays are designed to open when 800 amp flow after an interval of two seconds, and in case the overload exceeds 2000 amp, the selector switch will open in the same length of time. Instead of the generator switches being tripped on overloads, however, a signal lamp is lighted on the machine-control board. To safeguard men working on oil switches, special grounding devices are placed at several points in each high-tension gallery. This apparatus consists of an insulated rod with a metal tip connected to a flexible cable, one end of which is grounded through an expulsion fuse. Before discharging the static from a switch, the continuity of the testing circuit is tested by touching the tip of the rod on a metal plate which is connected to the underground conductor of a grounded lighting circuit through an incandescent lamp. The lamp will light if the cable is grounded, and the high-tension switch to be worked upon may then be discharged. After discharging, the static separate flexible cables may be fastened to the switch and the other ends connected to a grounded copper strip extending along the base of the switch compartment.

Field exciting current for the 19,000-kv-a generators and energy to charge the 142-cell storage battery on the first gallery is furnished by three 200-kw, 250-350-volt exciters located in the first basement. These exciters are driven by 7500-volt, 60-cycle induction motors having 15-amp, 3.33 per cent reactances in series with their leads. The motor-starting controllers are installed near them and are operated by the low-tension switchboard operator. The exciters deliver energy to the low-tension swtichboard and can be connected to any one of three busses. Different bus voltages can thus be maintained by segregating the exciters, and the entire 142 cells of the storage battery may be charged from one exciter while the others deliver exciting current to the generators.

The storage battery, consisting of 142 thin-plate lead-lead cells (3500 amp-hr at one-hour discharge rate), is at the south end of the first gallery. The cells are arranged in three rows and each one is supported on six glass oil-ring insulators, which in turn rest on a plate supported by four porcelain insulators. The end cell connections which are coated with acid-proof paint are supported from the ceiling by porcelain insulators. An auxiliary bus extends over each row of cells and is connected to a 5-volt, 1000-amp motor-driven direct-current generator, so that any cell can be charged individually. This generator is designed to operate as a booster, should it be required to do so. The battery room is ventilated by exhaust fans, and the air is washed to remove the acid before discharging it through the ventilating ducts.

As the feeders to the outlying substations and the tie lines to the New York Edison Waterside station operate at 15,000 volts, six banks of 2000-kw, 7500-15,000-volt transformers have been installed to step-up the generated voltage. Three of these deliver energy to the Waterside station and the remainder to substations. Each bank of transformers is air-cooled by an individual motor-driven blower set which starts to operate as soon as the transformer bank is energized. The motors are supplied with energy from special windings on the transformer cores. The air ducts supplying each bank may be connected if one motor fails to operate, as the other blowers will supply sufficient air. No connections between transformers are exposed. They are inclosed in asbestos compartments on the walls above the transformers. The transformer disconnecting switches are also installed in wall compartments. while pilot lamps indicating when their respective transformer banks are energized are fastened to wall panels.

One of the interesting problems of plants on rivers of great variation in stage at different seasons of the year, is the location of condensing apparatus. The new steam turbine plant of the Merchants' Lighting Co., at Little Rock, Ark., has all its condensing equipment in a pit directly beneath the turbines, hewn out of the solid rock to a depth of 41 ft 6 in. which provides for the 28 ft rise and fall of the Arkansas River. This feature in the new plant of the Louisville, Ky., Gas & Electric Co., is even more striking, as it is necessary to provide for the 45-ft rise and fall in the level of the Ohio River, from which the circulating water is obtained. To accommodate this varying level, the main turbine condensers are themselves installed at the bottom of a 30-ft concrete well. 53 ft deep, opening into the center of the turbine-room floor. The condensers are connected with the turbines by vertical 60-in exhaust lines. The one pit provides condenser space for four turbine sets, as it was feared to excavate additional pits which might give the building too large a displacement during floods.

The intake from the river is through a screen well on one corner of the plant property. This well is built of concrete and is situated 535 ft from the concrete intake cribs in the river. Two 42-in concrete pipes extend from the well to the water line of the river, where they connect to two cast-iron flanged pipes with flexible joints, which extend to concrete cribs located 75 ft apart in the river. Here the pool level is ordinarily maintained at 412 ft above sea level by the government dam below Louisville, but the intake pipes are so placed that they would remain covered with water even if the dam should be carried away by floods or ice.

The screen well is separated into two compartments by a concrete wall, each section connecting with one of the pipes leading into the river. The screens are placed diagonally across each compartment. Leading from the well to the condenser pit are two arched-roof concrete tunnels, the discharge tube being superimposed upon the intake tube. Since the top of the upper tunnel is about 5 ft below low-water mark, the siphon principle is utilized to assist in circulating the water through the condensers. By an arrangement of valves, the pipes leading to the river can alternately be made intake and discharge tunnels, enabling sediment that collects in them to be removed by reversing the direction of flow.

Some very interesting and practical observations on the large modern central-station steam plants were made at the March 18, 1914, meeting of the Chicago Section of the American Society of Mechanical Engineers. Mr. I. E. Moultrop said that he thought that increases in plant efficiency in the future would be obtained by giving additional attention to boiler-room operation. Although there are at present many accurate instruments for measuring and recording the operation of the electrical end of a station, instruments for boiler-room work have not as yet reached a desirable degree of accuracy. Speaking of boiler-room instruments now in use, Mr. Moultrop said that the visual load indicator was generally the first helpful device installed. Of other instruments he said that he thought the CO_2 recorder very good as a laboratory instrument but as yet hardly practicable for boiler-room use. The steam-flow meter was characterized as a most valuable aid to the fireman when used in conjunction with gauges and other instruments.

Discussing the subject of draft, Mr. Moultrop said that a stack large enough to carry the gases to an unobjectionable height would in most cases supply sufficient draft for the boilers, but forced draft affords better control. Ideal conditions exist where the stoker operating at the normal rating of the boiler uses only natural draft but is arranged so that during the peak forced draft may be utilized, forcing the boiler to 300 per cent of its rating. One unit in the station of the Edison Electric Illuminating Co. of Boston thus adjusted is ordinarily raised from 125 per cent load to 300 per cent load in five minutes when the peak comes on the station. Inasmuch as the economy of the plant is in the hands of the operating engineer, Mr. Moultrop contended that the time is past when the high-grade engineer should be placed in the turbine room, leaving the operation of the boiler room in the hands of the fireman. Since the advent of the stoker has changed the aspect of the modern boiler room, making it a light, clean and attractive place, there is no reason, he said, why this job should not attract better men.

Mr. J. W. Parker, of Detroit, Mich., speaking of the large boilers of the Detroit Edison Co., held that one advantage of the large unit is that the company can afford instruments for each boiler, allowing a closer watch upon the operation of each. As to the reliability of large boilers, he said that they are more to be depended upon than the turbines. The Detroit Company has never lost the use of a boiler during the peak, nor has it been obliged to take a boiler from the lines when it was needed. Although the large units were rather clumsy to handle at first, the centralization of all control apparatus at one point has eliminated this disadvantage. Thus far all apparatus is hand controlled as the development of proper types has been gradual, and the next step will probably be the design of an automatic machine to care for all of these operations. One change mentioned in connection with the large unit was the elimination of the small steam stoker engine and the substitution of a direct-current motor. Mr. Parker's opinion of the CO_2 machine differed from that of Mr. Moultrop, and he said that by taking samples of the flue gas at four different points on the same horizontal plane and automatically mixing the gases, he had been able to secure readings representative of the condition of the flue gases in the stack. In the Detroit Company's station the readings of the CO_2 recorder vary from 10 per cent to 16 per cent, the average reading being in the neighborhood of 13.5 per cent. Mr. Parker said that he was in favor of putting college graduates in charge of boiler-room operations as he believed they not only would gain good first-hand experience there but would be able to render valuable service to the company.

In commenting upon the engineering problems arising as a result of the purchase of energy amounting to 60,000 hp from the hydro-electric plant at Keokuk and the consequent invention of a quick-firing method for steam boilers, Mr. John Hunter, chief engineer of steam plants, Union Electric Light & Power Co., St. Louis, Mo., said that it is vital to keep dampers closed in such quick-firing boilers. Circulation of air should be prevented so that the brick settings will be kept hot. From observations it has been found in St. Louis that the firebrick suffers very little from the flames when the fires are started if these precautions are taken. Investigation has shown, however, that pitting occurs in the boiler drums near the water line. While this action is not serious, it has served to warn engineers that a danger confronts them. The pitting is of such character as to indicate that galvanic action takes place between the metals of the boilers and particles of carbonaceous matter adhering to them. Prevention of immediate further action has been accomplished by thoroughly cleaning the corroded spots, scraping and wire-brushing the entire inside of the drum, and applying two coats of graphite paint, permitting each coat to dry thoroughly. As a further preventive measure, the treatment of the boiler-feed water has been changed. Previously the company used a coagulant of lime and sulphate of iron, adding a small per cent of soda ash. Believing, however, that the soda ash caused the concentration of sodium sulphate in the boilers, which served as an electrolyte for the galvanic action, barium hydrate has been substituted for the soda ash. It is hoped that this chemical will remove all organic matter and a large percentage of the permanent hardness from the water, at the same time avoiding the presence of a strongly alkaline solution in the boilers.

Mr. W. L. Abbott, operating engineer of the Commonwealth Edison Co., expressed his belief that there is a large field for improvement in condensers, which had advanced less in recent years than any other piece of central-station apparatus. Condenser designers had followed too closely the work of boiler designers, with the result that the steam passed through the condensers at high velocities, creating high back pressures against which the steam generating units had to operate.

Note has been made in previous Progress Reports on coal bunkers placed under water, and a good deal of inquiry has resulted. During December the submerged coal bunker at the Metropolitan plant of the Kansas City (Mo.) Railway & Light Co., was filled for the first time. The bunker measures 340 ft in length and is 82 ft wide throughout the most of its length, and has a capacity of 30,000 tons of coal when its contents are heaped above the water line. The construction methods employed in excavating the pit were unique and perhaps even more interesting than the project itself. At the site of the present pit a mound of clay and soft earth formerly stood by the side of the station. To remove this small hill and to make an excavation of proper depth a turbine-driven boiler-feed pump supplying water at 200-lb pressure was connected to a pipe line leading from the boiler room to the site of the bunker. By playing a heavy stream of water from this pipe line on to the soft earth, the soil was loosened and washed beneath the power-house, through a drain, and ultimately down to the Missouri River, about a half mile distant. Warm waste circulating water which would otherwise have been diverted to the drain was used to feed the hydraulic excavating outfit, so that there was no great demand on the water system of the plant.

With the work of excavation completed, the walls and bottom of the bunker were then built up of concrete reinforced with 0.75-in twisted steel rods. Heavy concrete buttresses were placed in the interior along the south wall of the pit to withstand the strain imposed by the movement of heavy trains along the tracks at that side of the bunker, the tracks being on a level with the top of the concrete wall.

For conveying coal from one part of the pit to another and for loading the belt conveyors carrying the supply to the bucket conveyor system of the plant two motor-driven pumps have been installed. Each pump is capable of moving 1 cu-yd, or about 1300 lb of coal per minute. Both pumps are belt-driven from a single 100-hp motor placed upon a concrete pillar foundation above the water line in the pit.

In freezing weather, when it becomes impossible to move the coal by means of the pumps, a 2 cu-yd drag-line bucket is placed in service. By this arrangement the coal is carried to a crusher where both coal and ice are ground into pieces small enough to be conventiently handled by the conveyor systems.

LIGHTING AND LAMPS

The changes that sweep over the lighting field are in themselves quite sufficient to keep the central-station manager "awake o' nights," even if he had no other problems to lengthen the stretch of his daily thinking. Once in a while there may seem to be a lull in the activity of the inventor, or perhaps exhaustion on the part of his backer; but the march of progress is soon resumed, and new types, new efficiencies and new methods are alluringly offered. At the present time we seem to be going through a period of unusual advance, accompanied by some uncertainty as to where and when conditions may become stable again, and definite plans or contracts can be made for a reasonably short term of years that will allow protection to the investment required. With regard to both the arc lamp and the incandescent, wonderful progress can be recorded, and the vista runs far into the future as to the improvements and higher perfection to come.

At a joint meeting of the Illuminating Engineering and Municipal Art Societies in New York City on February 4, Mr. Arthur Williams presented some very interesting figures as to city lighting and the extent to which the arc lamp is still employed for the illumination of the thoroughfares of American cities. New York's public lighting bill for 1912, the latest year for which figures are available, was itemized as follows:

Electric lighting	$2,201,000
Gas	1,038,000
Naphtha	51,000
Total	$3,290,000

This total represents an individual cost of 65 cents per year per capita, or 0.8 mill per day per person.

The accompanying table, also presented by Mr. Williams, compares the number of arc lamps and population in representative American cities:

City	Population	Number Arc Lamps
Albany, N Y	105,000	1,000
Baltimore, Md	500,000	2,900
Boston, Mass	720,000	3,850
Chicago, Ill	2,300,000	8,920
Cleveland, Ohio	560,000	4,592
Los Angeles, Cal	325,000	7,400
New Orleans, La	340,000	3,400
Philadelphia, Pa	1,600,000	14,000
Pittsburgh, Pa	500,000	4,400
New York (Manhattan and Bronx)	2,900,000	9,900

Mr. C. F. Lacombe, chief engineer of the Department of Water Supply, Gas and Electricity of New York City, also presented interesting data as to relative street lighting conditions in Europe and America. He emphasized the very high intensities employed abroad in thoroughfares of high traffic density, the illumination being so great that objects are seen directly by their own reflected light rather than by silhouette. In London, Paris and Berlin, for example, the principal streets show intensities as high as 7.9 ft-candles to 2 ft-candles at locations near the lamps, with minimums of 0.25 ft-candle to 0.5 ft-candle at more remote points. Compared with these high values, similar streets and plazas in New York City, like Times Square, Fifth Avenue, etc, had maximum intensities not exceeding 1.2 ft-candles on the street surface, while the minimums fall as low as 0.08 ft-candle. In Fifth Avenue directly beneath the double-lamp standards, intensities of 1.7 ft-candles are found, with minimums of 0.05 ft-candles.

In Europe manufacturers have developed highly efficient types of flaming-arc lamps to operate several in series from multiple circuits, the control of the lamps being effected by pilot wires led from central points. There all such high-candle-power units are placed from 3 ft to 10 ft higher than in America. At these greater elevations the lamps are removed outside the glare angle, and it is possible to employ clear-glass globes, contributing to the efficiency of the lamp units. American business thoroughfares benefit largely from the coincident store-window and sign lighting. In Europe the high-intensity lighting is usually diminished after the hours of heavy traffic.

Before the annual meeting of the Pennsylvania Electrical Association (N. E. L. A. Section) last September, Messrs. Preston S. Millar, president of the Illuminating Engineering Society, and Norman D. McDonald read a paper on street lighting, dealing first with the general conditions which existed up to the beginning of the last decade. The 4-amp metallic-electrode arc lamp has been widely used during the past few years and is very acceptable for street-lighting purposes, replacing the open and inclosed carbon-arc lamp. The 6.6-amp lamp of the same type forms an acceptable substitute of higher power and in its adapted form for "white way" lighting is meeting with much favor. The inclosed flaming-arc lamp, upon the development of which manufacturers have specialized for the last few years, has hardly emerged from the development stage, so that no prediction could be made as to the place which it would find in street-lighting practice. The quartz lamp which has been proposed for street-lighting purposes has not as yet been employed widely enough to afford adequate information as to its qualities. The tungsten lamp extended the field for electric service for street lighting by providing a satisfactory efficient illuminant which competes successfully against gas mantle lamps. The series tungsten lamp is giving satisfactory service, and the multiple tungsten lamp is being employed in some cities as a competitor of the gasoline mantle lamp for lighting parks, etc. Among the most recent developments was the invention of the tungsten lamp of high power for series and multiple lighting, and it remained to be determined what effect this half-watt lamp would have upon street-lighting practice. Assuming it to be a reliable and satisfactory illuminant, it would appear to be a formidable competitor of the arc lamp. Arc-lamp manufacturers are looking to the use of high currents as a means of increasing the efficiency of the lamps, so that all of the most recent developments point to much higher-powered illuminants for the near future. The authors called attention to the gradual increase in the intensities of street lighting throughout the country and went deeply into the subject of tests of street illumination, glare and the contractual aspects of street lighting. The intensities of illumination of street service, in foot-candles, were given as follows: Principal streets in cities, 0.25 to 1.0; important side streets, 0.1 to 0.25; resident streets, 0.1 to 0.05; suburban roads, 0.01. As a standard for comparison of these intensities, it may be stated that bright moonlight is of the order of 0.015 horizontal ft-candle.

Reference may be made to a few of the more recent changes, developments or installations, dealing first with those in arc lighting. An interesting case is presented by Cincinnati, Ohio, where a large number of inclosed arcs were replaced during the year by 6000 4-amp magnetite units. The new high-powered illuminants when hung from the "bishop crook" posts which carried the older lamps were found to give trouble and even discomfort from glare in the eyes of passers-by. This difficulty had not been apparent with the former low-power units, but became so critical with the initial trial installations of the magnetite lamps that it was found necessary to raise the posts by about 7 ft 6 in and so increase the visual angle. This change was accomplished by first sawing in two the old shanks and then socketing these stumps into pieces of 4-in pipe, 10 ft 10 in in length. The original standards were of 3-in pipe, which was found to fit snugly inside the 4-in extension piece. An ornamental cap was added at the top of the extension to make a neat fitting joint. Above this point the old poles were tapered into 2.5-in pipe, and again to 2-in pipe to form the curved neck.

The reconstructed poles place the point of lamp suspension at a height of 21.6 ft above the pavement level, bringing the arc itself at a height of approximately 18 ft, well out of the way of direct vision.

At the beginning of this year 148 new street lamps were put into service on Pennsylvania Avenue, Washington, D. C., between the Capitol and the Treasury. The installation of the present lighting system is the first step in the movement toward making Washington one of the best lighted cities in the world. The new lamps are spaced 100 ft between centers along the curb, being so staggered that they are placed at intervals of 500 ft along the street. By this arrangement the lamps form the four corners of an equilateral rhombus, the width of the street being approximately the same as the spacing of the lamps along the curb. The lamp standards, which were especially designed for Washington and are similar to those in use around the Union Station, are made of iron with an oxidized copper finish. Each carries a 6.6-amp, 520-watt luminous-arc lamp giving 1500 c-p at the angle of maximum intensity. The alabaster diffusing glass globe is made up of twelve segments and has a transmission coefficient of 66.6 per cent, which makes the combination arc and globe give approximately 100 c-p. The lamps formerly used gave 700 c-p and were not incased in diffusing globes.

The cost of the lamp standard was $26.90 and that of the diffusing globe $40.50. It was owing to this high initial cost that the globe was made in twelve segments, so that when one is broken it can be replaced at a relatively small expense. The standards and the globes are the property of the District of Columbia, and the arc lamps are furnished by the Potomac Electric Power Co. as part of its equipment. The lamps are operated by Brush arc machines, rewound for 6.6 amp. The system is being operated

3942 hours per year, only half of the lamps being in use after 1 A M.

During the year, the city of Niagara Falls, N. Y., adopted a double-bracket combination arc lamp and trolley pole, which may be noted as one of the first attempts in this direction of lessening the pole-line burden in street occupancy. Along Falls Street between Riverway and Fourth Street and North Main Street between Michigan Avenue and North Avenue, the thoroughfare is illuminated with such units. The handsome poles are spaced 70 ft apart with two lamps on each pole, one extending over the roadway and one over the sidewalk. The sixty poles on Falls Street and the fifty-four poles on Main Street take the place of the previous iron trolley poles and become the property of the city.

In order to avoid slotting the poles at the ground line, thus weakening them at the point of greatest strain, the cut-outs have been placed in the body of the ornamental fixture. A small ring suspended by a short chain is the only outward evidence of the cut-out. By using a small hooked rod the operator can light or extinguish the lamps from the sidewalk by pulling the chains. The chains are insulated from the current-carrying parts to obviate danger of leakage at this point.

The poles each carry two inverted magnetite arc lamps, making a total of 224. Energy for the operation of the lamps is furnished free by the Hydraulic Power Co., and the Niagara Power Co., and distributed without charge by the Niagara Falls Electric Light & Power Co.

As noted in the report of the Committee on Progress of the Illuminating Engineering Society there was a marked tendency during the year toward the use of larger arc units and the use of the flame arc. "The flame arc lamp is of special value in lighting large areas, and is particularly adapted to smoky and dusty places, such as foundries, blacksmith shops, and railroad train sheds. In fact, one of the largest railroads in the country spent months in trying out various systems of lighting for the train shed of one of their large stations and, after experimenting with various systems of lighting, finally decided to use the flame arc lamp exclusively, adopting it also for the yard.

"This lamp has been improved so that the fumes thrown off by the arc are condensed and are thus prevented from forming a deposit on the globe and from escaping into the air. The lamp is also economical as far as maintenance is concerned, as one set of carbons will burn from 100 to 120 hours without attention.

"A rather novel device is an arrangement for converting any enclosed arc lamp, alternating or direct current, series or multiple, and regardless of voltage, into a flame arc lamp. Many minor improvements have been made in construction of the arc lamp such as making the clutch work on the electrode indirectly, thereby keeping it independent of the size of the electrode, improving the feeding arrangement, etc. The lamps are now made to give any desired range of color and to work under any ordinary condition even, as in one lamp recently introduced, on a 25-cycle circuit, and have reached an efficiency of 0.25 watt or better per candle with possibilities of further improvement.

"One of the most interesting applications of the long-hour series alternating current flame carbon arc lamp is to low frequency circuits of 25 cycles. With the unimpregnated carbon lamp, there is a flicker at each reversal of polarity which, at this frequency, is very marked. In the flame arc lamp, the light is obtained from the arc screen and is, therefore, independent of polarity."

A really considerable number of 10-amp flame arcs are now in service on American streets, and apparently more of them may be expected. They can be seen in street service in such cities as Newark, N. J., Chicago, Cleveland, St. Paul, Atlanta, Richmond, Va., Council Bluffs, Ia., Augusta, Ga., Kansas City, Kan., Port Huron, Mich., Austin, Tex., and many other places. Those in Chicago are on 10-amp, 60-cycle circuits, taking from 55 to 65 volts per lamp. They are spaced about 23 to the mile, or an average of one to every 230 ft of street. With the exception of a central underground district the line is carried overhead on tubular steel poles, and the lamps are mounted 25 ft above the pavement. They run about 100 hours between trimmings and burn all night.

The most impressive event of the year has, of course, been the introduction to service of the nitrogen-filled high-efficiency tungsten lamps, which have at once taken their place in the department of street illumination and bid fair to be "among those present" in other parts of the field. Their introduction to the lighting public was virtually made at the Cooperstown convention, in September, of the Association of Edison Illuminating Companies, when the exhaustive report of its lamp committee by Mr. John W. Lieb, was accompanied by a display of such "half-watt' tungsten lamps ranging from 500 to 5000 c-p, with specific current consumptions ranging from 0.75 watt per c-p in the smaller sizes to 0.5 in the largest units.

A most interesting paper on the subject of these lamps was presented before the American Institute of Electrical Engineers, on October 10th, by Dr. Irving Langmuir and Mr. J. A. Orange, who described the stages by which the point had been reached in the prevention of "blackening" in a tungsten lamp by the introduction of an inert gas into the bulb at atmospheric pressure, which not only decreases the rate of filament evaporation, but by proper design of the lamp parts, may be made to prevent blackening of those glass surfaces through which light is transmitted, the result being to make possible increased lamp life at high efficiencies. They had thus been able to construct large tungsten lamps which, starting with an efficiency of 0.40 watt per candle-power, have run over 2000 hours, with an average efficiency of 0.5 watts per candle over that period.

Experiments with filaments of various sizes early indicated the desirability of using large diameters. The larger filaments gave not only a better efficiency at any definite temperature, but also a much longer life. Thus, doubling the diameter decreased the consumption from 0.65 to 0.56 watt per candle, and increased the life from 90 to 300 hours. This improvement in efficiency is attributed to the relatively greater heat loss by convection from small wires. The life of the filament is determined largely by the loss of tungsten from the filament by evaporation, and has been found to be dependent on the relative decrease in diameter thus caused. The evaporation of tungsten in nitrogen is largely a diffusion process, and is nearly independent of the size of the wire. The rate of evaporation per unit area is thus inversely proportional to the diameter. Relative lives of very small wires in nitrogen are therefore nearly proportional to the squares of their diameters.

But filaments of large diameter require very large currents to maintain them at the operating temperature, 2850 deg.; hence unless very low voltages are used, the energy consumed by the larger wires is so large that only lamps of high candle-power could be made. To increase the effective diameter of the filament without decreasing its resistance, a tubular section might be used, but the more practical construction, and the one adopted, takes the form of winding the filament into a tightly coiled helix.

For bulbs of the same volume the nitrogen lamps give roughly from five to ten times the candle-power of evacuated lamps, but the bulbs of such filled lamps naturally run much hotter than those of ordinary lamps. The upper parts of the bulbs are often 100 to 200 deg. cent., or more, while the lower parts are sometimes much cooler than this, although closer to the filament. Several special varieties of heat-resistant glass have been used for the bulbs, making considerably smaller sizes possible, as well as rendering it easier to get rid of water vapor.

Special lead-in wires had to be devised to convey the heavy currents (20 to 30 amp) involved in the larger sizes of these new lamps. Platinum has been discarded entirely, even in the smaller lamp sizes, special alloys being substituted which have the same coefficient of expansion as the glass. Bulbs of special glass into which tungsten or molybdenum wire can be sealed directly, have also been tried. Where the leads enter from the top of the bulb, special precautions have to be taken to protect the wires against the high-temperature convection currents.

For the particular type of nitrogen-filled tungsten lamp at present furthest developed, lives of over 1500 hours at efficiencies better than 0.50 watt per candle have been obtained only in large units taking over 10 amp. Lamps running at 0.6 to 0.7 watt per candle, have been made in units taking at least 5 amp. No serious difficulty has been met in making high-voltage lamps of this type, for in nitrogen at atmospheric pressure there is no tendency toward arcing, even at 250 volts. Many lamps taking 6 or 7 amp at 110 volts have been made up and run at 0.6 to 0.7 watt per candle, with a life of over 1000 hours.

A number of special types of nitrogen-filled lamps which have been made and tested are the following:—

(1) *Large Units of Very High Efficiency* (0.4 *to* 0.5 *Watt Per Candle With a Life of* 1500 *Hours or More*)

These lamps take currents of 20 to 30 amp and (except in units over 4000 c-p) are therefore best run from alternating-current circuits by means of small transformers or auto-transformers giving a voltage depending on the size of unit desired.

Thus, with 30 volts and 25 amp, the power taken would be 750 watts and this, in a lamp of say 0.45 watt per candle, would give 1670 c-p.

(2) *Small Units of Low Voltage*

These take currents of 10 amp or less and work at pressures as low as 4 or 5 volts. The efficiencies with 1000-hour life range from 0.6 to 1.0, or even 1.25 watts per candle, according to the current used. These lamps are adapted for series street lighting on 6.6-amp circuits (at 0.6 to 0.7 watt per candle), for stereopticon lamps, for automobile headlamps, and for use in general wherever a source of high intrinsic brilliancy, steadiness and white color is needed.

(3) *Lamps to Run on Standard Lighting Circuits* (110 *Volts*)

Large units of this type (several thousand candle-power) have efficiencies of 0.5 watt per candle or better. With smaller units the efficiency is not so high.

Besides high efficiency, the features of the new lamps which are of advantage are:—

(1) *Color of Light*

The temperature of the filament being 400 to 600 deg. higher than that of ordinary lamps, causes the light to be of a very much whiter color, so that it comes closer to daylight than any other form of artificial illuminant, except the direct-current arc and the vacuum tube containing carbon dioxide. The color is almost exactly like that which can be had for a few minutes by running an ordinary tungsten lamp at double rated voltage.

(2) *High Intrinsic Brilliancy of the Filament*

At the operating temperature of the nitrogen-filled lamps the intrinsic brilliancy of the filament is about 1200 c-p per sq cm. In ordinary tungsten lamps, on the other hand, running at about 1.25 watts per candle, the filaments have a brilliancy of only about 150 c-p per sq cm. This feature, combined with the high degree of filament concentration, renders these lamps particularly useful for projection work in headlamps and stereopticons.

(3) *Constancy of Characteristics During Life*

It is often possible to design these lamps so that their current, pressure, and candle-power characteristics remain practically fixed during the greater part of their lives. In any case, however, since there is no deposit on the bulb to cut off the light, the candle-power practically never falls below 75 per cent (this decrease sometimes being due to sagging). The lamp usually fails by the breakage of the filament, with the candle-power well above 80 per cent of its original value.

The spherical candle-power of many of these lamps has been measured. The ratio of mean spherical to maximum horizontal (practically mean horizontal also) candle-power has been found to average about 84 per cent for the lamps made with single loops of helically wound wire.

In concluding the discussion Dr. Langmuir confessed some doubts as to the possibility of making nitrogen-filled lamps in small units, although he expressed belief that beginning with the 500-watt size, or even smaller, the new lamps can be made in units ranging up to 25,000 or 50,000 c-p, with ultimate efficiencies of possibly 0.3 watts per candle-power. Argon at higher pressures, he said, now holds promise of being a great improvement over nitrogen as a gas filler for incandescent lamp bulbs.

The results thus far obtained indicate that argon will be substituted for nitrogen in the lamps just as soon as the rarer gas becomes readily available on a commercial scale. Being one of the rare constituents of the atmosphere it is very difficult to produce in small quantities, but on a large scale it can be made very cheaply, comparatively speaking, and will afford an improvement over nitrogen.

These larger nitrogen-filled lamps have, of course, had an immediate "try-out" in outdoor work, challenging even the "bigger, brighter" flame arc. Hartford, Conn., is, as usual, on the progressive firing line, and nitrogen-filled series tungsten lamps are to be installed by June 1st in the business district of Hartford, Conn., for ornamental street-lighting service under a five-year contract recently made by the city with the Hartford Electric Light Co. The lamps are to be placed on 141 double and 113 single standards and are to deliver 300 c-p each at an angle of 20 deg. below the horizontal through acorn-shaped diffusing globes carried at a height of 15 ft above the street surface. For each double-lamp standard the city will pay $80 per year and for each single-lamp standard $55 per year, the service to be from dusk until dawn. The city is to furnish the standards and the company is to care for their installation and maintenance and to provide and maintain all other equipment associated with the installation. Seattle is also reported to have done already considerable experimental work on street lighting with "nitrogen-filled" lamps, the complete data in regard to which will be interesting.

As a result of tests made by the electrical department of the Sanitary District of Chicago under the supervision of Mr. E. B. Ellicott, electrical engineer of the District, it will use 2000 nitrogen-filled metal-filament incandescent electric lamps for street lighting. These lamps are to be of the 300-watt and 500-watt sizes, the former giving 600 actual c-p, and the latter between 1100 and 1200 c-p. The two sizes are ordered for different sections of the city, the smaller lamp being used principally in residential quarters. The new lamps will be operated on straight series-arc alternating-current circuits from compensators which give 20 amp in the secondary of the circuit.

The nitrogen-filled lamps will be suspended at the same height and in much the same manner as the flame-arc lamps; that is, at about 26 ft above the street pavement, one lamp being supported by each lamp post on a bracket. The lamp manufacturers have offered a guarantee of 1350 hours of life, which means an average of three lamp renewals a year. It is believed that the lamps will maintain their candle-power within 10 per cent of the initial rating for the whole term of the life of the lamp. Both sizes of lamps take about 30 volts on the series circuits. They have been operated in tests intermingled with flame-arc lamps, and it is practicable, apparently, to operate mixed circuits. However, it is likely in the permanent installation that the nitrogen-filled incandescent lamps will be operated on individual circuits, the number of lamps to each circuit not exceeding 125.

How new all this is can only be illustrated by the fact that we are still introducing magnetite arc lamps, as well as the flame arcs, in large quantities, for street lighting, each installation having its own well-reasoned explanation; and in the meantime no little is being done in the way of ornamental low-post tungsten lighting so much in vogue these last few years. For example, the new ornamental street-lighting system at Paducah, Ky., extends from First to Eleventh Street on Broadway, the city's principal business thoroughfare. More than 1000 incandescent lamps have been used, making the street "as bright as day." Strings of 25-watt tungsten lamps are festooned between posts, instead of the use of globes on ornamental iron standards, the expense of which was deemed objectionable. Paducah's "great white way," as the citizens proudly call it, is maintained by nearly 100 local business men who have interested themselves and assume all expenses of operation.

Tampa, Fla., is another illustration of the desire to intensify street illumination and join in the procession. The first cost of installing 200 ornamental tungsten lighting standards on Franklin Street, Tampa, Fla., was defrayed by the abutting property owners, who paid for the improvement on the basis of $1.12 per front foot. Extra posts for the street intersections were provided out of the city funds. For the first twelve months the abutting merchants also met the cost of operation of the lighting system, the agreement being that after the first year the city should take over the maintenance of the posts.

Each standard carries four 60-watt and one 100-watt tungsten lamps. The installation is lighted from dusk to midnight, after which the regular city magnetite-arc lamps are switched on. Under its five-year contract with the city, the Tampa Electric Co. furnishes the service at an equivalent return of 8.25 cents per kw-hr. The cost of installing the present equipment was $6,200, each of the bare posts having cost $30. In addition to the seven city blocks first equipped, six more squares are being similarly lighted with ornamental standards.

In view of the fact that the Association has two co-operating Lamp Committees it is not necessary for this Report to go into details as to the development and advance of the tungsten lamp as used in ordinary service, but it may be worth while to insert the table herewith, based on the number of lamps sold of the different types, within the last few years.

Type	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Carbon	93.27	84.12	68.98	63.08	52.90	25.47
Gem	5.88	8.58	15.07	14.88	19.00	33.59
Tantalum	0.75	1.78	2.12	3.57	2.74	1.00
Tungsten	0.10	5.52	13.83	18.47	25.30	39.94
Total	100.00	100.00	100.00	100.00	99.94	100.00

This table tells a story whose emphasis is intensified as each year is added. It may be supplemented by the statement that the office of the supervising architect of the United States Treasury Department has ordered that carbon and metallized carbon-filament lamps are no longer to be used in any of the government buildings, and that any such lamps in use at the time of the receipt of the order must be removed and 25-watt tungsten lamps substituted. Thus progress goes on, "Lest one good custom should corrupt the world." It has been estimated that the development has been running about this way:

	Approx. 1913	Estimated 1914
Tungsten	62.4	71.6
Gem	21.7	15.7
Carbon	15.5	12.7
Tantalum	0.4	....
	100.0	100.0

Not only has the bulk of the incandescent lamp production changed from a carbon basis, but the efficiency of tungsten lamps, in the meantime, has been materially increased, while during the same period, the price has decreased considerably. The 40-watt lamp in 1907 was listed at $1.50 and in 1912 at 45 cents, and there have been subsequent reductions. The approximate average candle-power of all incandescent lamps sold in 1907 was 19 candle-power, whereas in 1912 it had risen to 29.

ELECTRIC VEHICLES

Very gratifying progress can be reported in the introduction of electric vehicles and their utilization alike by the central station and the general public. To this end the work of the sister Electric Vehicle Association of America contributes in large measure, and the N. E. L. A. has been glad to join hands with it especially in the co-operative effort, country-wide, to secure the larger use of electrics by the United States Post-Office Department. The report of the Gilchrist Committee of the E. V. A. on rates and charging stations presented at the annual convention in Chicago at the end of October, 1913, was in itself a remarkable evidence of the degree to which central stations had taken up the new work or were giving attention to it. A little of this data may be here quoted:—

"In 1911 the Committee on Rates and Charging Stations gathered much data on prevailing rates and facilities for battery charging from 82 of the largest cities in the United States. The report showed a very great variation in rates, which was taken as evidence that the central stations had not given the attention to the matter the business deserved. The Committee, therefore, recommended low rates to garages, both public and private, by the central stations, and low charging rates by the garages to their regular customers. In order to determine the effect of these recommendations, your Committee this year recanvassed the central stations in cities of 25,000 or more inhabitants, and is pleased to report a very marked improvement over the 1911 report. In order to reduce the great mass of detail on rates to a more tangible form, the Committee took two examples: First—A public garage having 24 passenger cars and 12 commercial cars as regular patrons. From data at hand it was calculated that this garage would have a demand of 60 kw, a connected load of 100 hp, and would take 13,200 kw-hr per month. Second—A private garage, with only one passenger car, the average demand being 2.5 kw, a connected load of 6 hp, and a consumption of 175 kw-hr per month.

"These cases were figured out on the rates reported by each city, and the rate per kilowatt-hour which would be earned was determined. It is interesting to note that the average, as reported by 91 of our largest cities, is 3.007 cents per kilowatt-hour for the public garage and 5.338 cents for the private garage.

"Comparatively little change has been made by the public garages toward making separate charges for the current actually used, the prevalent practice being a monthly rate depending upon the size of the vehicle, or a flat price per charge regardless of quantity taken. Out of 128 answers to the Committee's questions, only 31 cities report the garages in their district as metering the current. Some charging stations in our largest cities have found it necessary to install heavier equipment for the increasing demand for rapid charging rates. In order to determine these demands, and if conditions warranted it, to make recommendations for equipment for charging stations, your Committee asked a series of questions, but so little data was returned they do not feel justified in making any suggestions at this time.

"In Chicago the garage owners formed a wide-awake, active association, and have published a small handbook containing much data and instructions intended for owners of electric cars. The book also contains a list of all garages where current can be had for charging, both in Chicago and its suburbs. Associations of this character should be encouraged and assisted, and your Committee believes our own Association would be strengthened if more of the electric garage owners could be induced to join us and take active part in the work.

"This report would not be complete without a word about the battery-service system originated by the Hartford Electric Light Co. Under this system the Hartford Company buys, maintains, charges and installs in the customer's truck all batteries necessary for its continuous operation, claiming that the advantages to the truck users are: (1) A substantial reduction in truck investment; (2) no charging apparatus or garage necessary; (3) A battery exchange system which insures unlimited mileage and continuous service from trucks; (4) relief from care of batteries; (5) reduction of all items of battery cost, including current to a basis of miles traveled per month.

"For this service the company charges a flat rate of from $15 to $60 per month, depending upon the size of the truck, to which is added a mileage charge of from 1½ cents to 7 cents, depending upon the capacity of the truck and miles traveled per month.

"The Washington Water Power Co. of Spokane, Wash., we are informed, has adopted a similar system, differing only in the equipment used.

"There are many, no doubt, like this Committee, genuinely interested to know what the final results will be when this system has been thoroughly tried out and proved by time."

Herewith is an interesting tabulation of the schedule of rates made by central stations in various cities for the charging of customers' electric-vehicle batteries. In some cases the concession made by the electric company requires that the customer avoid coming on the lines with his charging load during the peak period. Other central stations make no such restrictions, offering the special rate without limitations. Usually a minimum bill of $3 or $5 per month is collected to meet the readiness-to-serve cost of the heavy charging load. for in residential dis-

CENTRAL-STATION RATES FOR VEHICLE CHARGING

City	Rate per Kw-hr cents
Schenectady, N Y	5
Augusta, Ga	5
Turners Falls, Mass	3
Columbus, Ohio	4
Long Island City, N Y	12
Cambridge, Mass	5
Memphis, Tenn	3
Brockton, Mass	4–5
Portland, Ore	4–1.5
Mobile, Ala	4
Plattsburg, N Y	3
Worcester, Mass	3
Montgomery, Ala	1.5–2.5
New Bedford, Mass	3.5
Meridian, Miss	2–6
Denver, Col	3

tricts this often requires the installation of additional transformers and copper. The rates made for alternating-current and direct-current charging service are usually the same, the customer defraying the cost of the slight loss in conversion, through a mercury rectifier, motor-generator or rotary converter, in outlying districts where only alternating-current service is available. The report of the E. V. A. above referred to gives a very complete tabulation of data of this character for over one hundred cities, in full detail.

The accompanying table was published in October, 1913, by the *Electrical World* as to energy consumption and income from vehicles and trucks in representative communities in which central stations were known to be doing a vehicle-charging business, replies having been requested to questions concerning the monthly kilowatt-hour consumption of and monthly income derived from electric pleasure cars and commercial trucks. While the data obtained are not as complete as might be desired, the figures presented give a good idea of average conditions in this country. For example, the table reveals an average kilowatt-hour consumption for pleasure vehicles of 169 kw-hr per month. The average rate earned per kilowatt-hour is 4.15 cents, and the average central-station income per car per month is $7.01. For electric trucks the average monthly energy consumption is 980 kw-hr, and the average monthly income per truck is $33.18. It may be noted that at the Chicago Electric Vehicle Convention, President Arthur Williams made the statement that in the larger cities alone, if all the trucking were done electrically at 2 cents per kilo-

ENERGY CONSUMPTION AND INCOME FROM VEHICLES AND TRUCKS

	Pleasure Vehicles			Commercial Trucks		
City	Number in Use	Kw-hr per Month	Monthly In-come	Number in Use	Kw-hr per Month	Monthly In come
Brockton, Mass	25	135	$9.59	9	2180	$52.32
Columbus, Ohio	400	200	8.00	..	....	.....
Denver, Col	822	...	....	52	....	.....
Memphis, Tenn	150	170	8.20	30	800	35.00
Meridian, Miss	2	97	4.85	..	....	.....
Mobile, Ala	39	264	10.56	1	208	.....
Montgomery, Ala	8	180	3.60	..	....	.....
Muskogee, Okla	30	...	7.00	10	....	.....
Portland, Ore	55	165	7.00	35	1000	20.00
Rochester, Ind	2	...	....	2	750	30.00
Schenectady, N Y	14	100	5.00	1	716	.....
Turners Falls, Mass	1	211	6.33	..	....	.....
Worcester, Mass	10	...	20.00	14	1200	28.60

watt-hour the annual income would be $400,000,000. That is the present income of the central-station industry from all sources.

Another table based on data from central-station companies that operate electric vehicles in their own service, gives figures as to unit costs per mile for the maintenance and repairs of batteries, tires and cars. The results as tabulated show little consistency, for the cars referred to were performing a variety of service and were working under various different conditions ot paved streets, steep grades, etc.

COST OF REPAIRS AND MAINTENANCE OF ELECTRIC TRUCKS

	Average Miles per Day	Cost in Cents per Mile		
		Batteries	Tires	Car
700-lb wagon	7	2.9	1.1	1.9
750-lb delivery wagon, lead cells	20	8	1	...
1000-lb truck	16	5.6	2.1	0.5
2000-lb truck, lead cells	21	3.9	1.7	1.9
2000-lb truck, lead cells	15	14.6	3.9	2.9
3000-lb truck, nickel-iron cells ..	18	1.5	0.9	3.9
7000-lb truck,lead cells	22	3.2	6.7	8.2
Five cars and trucks, 3000-lb to 700-lb, lead and nickel-iron cells	35	2.8	2.5	1.0
Thirteen cars and trucks, 750-lb to 4000-lb, lead, and nickel-iron cells	35	2	2	2

In this connection, as a specific case, the work of the Springfield, Mass., United Electric Light Co., may be mentioned. Within the past year it revolutionized its transportation service and at the end of 1913 had in use a fleet of ten trucks, in regular operation, ranging from 750 pounds to 5 tons capacity. Its large stable had been turned into a garage, and a number of horses and stablemen displaced. A 5-ton machine is operated for cable pulling, and two covered 1000-pound electric vans are used in the meter department, with a special floor covering of thick velour to provide an easy riding surface for the instruments. In a 15-month period, one of these cars was run 9000 miles at a total cost of operation of 10 cents per mile, inclusive of depreciation, one set of tires, current and license. The cost of electricity for a day's run about the city was about 3.7 cents per mile, figuring the energy charge as high as 6 cents per kw-hr. The meter wagons run at a speed of about 16 miles an hour. In its electric transportation work, the company has saved about 30 per cent over its former horse-traction costs.

In a paper before the ninety-fifth semi-annual meeting of the National Association of Cotton Manufacturers at Atlantic City,

N. J., Mr. Day Baker pointed out that in a one-story garage, not over 25 ft by 65 ft in dimensions, may be housed a complete equipment of five electric trucks, which will displace and perform the work of nine or ten horse-drawn trucks and eighteen to forty horses, depending on the size of the trucks required and the methods of operation. Many special applications of electric trucks can be made to advantage. For example, an electric winch was recently installed on one of the yard trucks of a Lowell, Mass. textile plant. With this winch, freight cars are switched in a shed where steam locomotives and gasoline trucks are prohibited. The winch is also used in loading heavy cases and in shifting cars around the loading platform. Rapid advance, he said, is being made in industrial truck applications for indoor service. An installation of twenty-five of these is in service on the New York pier of the Fall River Line steamers. The trucks are capable of ascending a 20 per cent grade, and they operate in extremely confined and congested quarters. The operators drive the trucks at three times walking speed, and each carries from two to three times the weight portable on a hand truck. A fleet of ten such trucks is also in use at a print works in Lawrence, Mass., hauling rolls of print cloth from the storehouse to the printing machines and transporting dye tubs between the color room and the machines. One of these trucks in a plant near Montreal is equipped with a hand winch for warping on coils of wire, and one recently built is designed to carry fire extinguishers and other protective apparatus for mill service. In a representative mill an industrial truck carrying two men delivers six full beams of cloth and returns with six empties in eleven minutes, the beams weighing 1902 lb. Fifty-five minutes was formerly required for this work. By the introduction of industrial trucks, savings in labor running sometimes as high as 70 per cent are being secured, and the original cost of the truck is soon cared for.

It has been estimated that there are now well over 40,000 electrics of one kind or another in service. A count made at the end of September showed the number garaged and in operation on Manhattan Island alone to be 1944. At the end of the year, Denver alone had 822 electric pleasure cars and fifty-two electric trucks, evidence of the remarkable development which is following the aggressive campaign of the Denver Gas & Electric Light

Co. The latter's vehicle charging output alone totaled 180,000 kw-hr monthly in 1913, practically all of which was off-peak business with its demand coming between 10 P M and 8 A M.

In order to introduce and popularize the electric vehicle, the Denver Company, a few years ago created a special department of electric-vehicle and storage-battery engineering, with an expert engineer in charge. The first duty assigned to the engineer was to develop a higher class of service in existing garages, both public and private. He also set about establishing an educational scheme among the men of the company's commercial department, by devoting a portion of each day to soliciting electric-vehicle "prospects" with the salesmen having charge of the various territories.

During this work personal calls were made on the owners of private garages, and instruction was given to those who desired it concerning methods of charging batteries and inspection of vehicles. Meanwhile particular attention was devoted to a campaign of solicitation directed at the officers and heads of firms and mercantile houses, with a view to interesting them in the adoption of electric vehicles for transporting and delivering goods. Different makes and types of vehicles were explained and data furnished as to cost, operating expenses, body designs, etc, of cars especially suited for the customer's purpose. In other words, the prospective user had placed entirely at his disposal the vehicle department's facilities for investigating motor delivery by means of electric-driven conveyances.

In addition to these direct selling efforts, the publicity department of the Denver Gas & Electric Light Co., also issues an attractive sixteen-page monthly bulletin which is inclosed in colored covers and made up of interesting and authoritative reading matter concerning electric vehicles, both local and general. At intervals, spaces in the newspapers are devoted to electric-truck advertising, and billboard displays are also used to good advantage in furthering the work of publicity.

Sixteen public garages, with a capacity for stabling 910 vehicles, were in operation in Denver at the end of 1913. For garaging, charging, washing and delivering electric pleasure cars the garage rates range from $25 to $35 per month. For trucks the rates vary from $30 to $90 per month, depending upon size. The average rate received for vehicle charging in Denver is 3 cents per kw-hr.

When the Meridian (Miss.) Light & Railway Co., recently placed in service several electric trucks for its construction and maintenance work, Mr. C. A. Knight, of the central-station company, conceived the idea of placing small electric signs on the sides of one of the 1000-lb vehicles. These signs are supplied with energy from the truck battery, and advertise the central station, the electric-vehicle business and the use of electric displays.

The signs were made in small panels 4 ft long and 20 in wide, reading, in two lines of 6-in raised electric letters, "Use the Electric." The letters are fitted with candelabra receptacles and small tungsten lamps, the switch being controlled by the driver of the car.

Mr. Knight is quoted, however, as saying that the only drawback to the scheme has been its analogy to the famous small Mississippi River steamboat with the big whistle. When the boat ran they couldn't blow the whistle, and when they blew the whistle, they couldn't run the boat. This difficulty has been overcome, however, in the case of the electric truck by lighting the signs when the truck stops and turning them off again at starting. The signs are also lighted and used when coasting.

At the meeting of the contract department of the Commonwealth Edison Co., on November 11th, Mr. R. Macrae read a paper on the electric-vehicle situation in Chicago, when he cited some startling figures as to the rapid rate at which horses are disappearing from the streets of Chicago. Applications for energy to operate mercury-arc rectifiers were being received by the company at a rate that would represent the work of fifty or sixty horses a month. As only about 20 per cent of the electric vehicles in Chicago are charged from rectifier outfits, it is fair to assume that electric vehicles are now displacing horse-drawn vehicles at a monthly rate corresponding to the work of 300 or 400 horses.

Mr. Macrae predicted that vehicles operated by electricity will ultimately displace all other kinds of vehicles for city street traffic unless some very radical improvements are made in the other vehicles. He exempted touring and racing cars, referring to commercial and pleasure vehicles for city use. It is true that conditions do not now foster in all cases in cities the operation of electric vehicles, but they are slowly becoming more favorable.

Experience has shown that commercial electric vehicles operated in fleets are always a success; operated singly they are often a failure. In the one case they are properly cared for; in the other they are usually neglected. In advising its customers the central-station company should point out that the electric vehicle, to be a success, should be cared for intelligently and operated as an electric vehicle and not in the way a horse-drawn or gasoline vehicle is operated.

Mr. Macrae exhibited a number of lantern-slide pictures, one of which was a composite load curve made up of the averages of six public garages, and showed that there was little consumption of energy from 8 A M until noon, almost none from noon until 8 P M, and that the maximum occurred at 2 A M. This is exactly the kind of load the central station needs. In relation to the mercury-arc rectifier used in vehicle battery charging, Mr. Macrae described Chicago as a rectifier town. This no doubt is due to the fact that so large a proportion of the area of the city is served by alternating current. The operating company has had little trouble with rectifiers, particularly in the smaller sizes. The tube is the best kind of a protective device. While it is buzzing away, the vehicle owner or the garage proprietor may rest assured that everything in the charging process is going along all right. There were over 550 mercury-arc rectifiers on the circuits of the Commonwealth Edison Co., and Mr. Macrae had never heard of a serious complaint.

Figures were given to show that the average cost per mile of the electric delivery service of the Commonwealth Edison Co., considering the results obtained with a fleet of fifty vehicles, is 25.1 cents. Of this amount 9.3 cents is for operating and repairs and 2.4 cents for electrical energy used in charging the batteries. The cost of this energy is figured at 4 cents per kw-hr, which is twice as much as an outside consumer could buy it for under the most favorable conditions. The cost per mile for operating a corresponding horse-drawn vehicle in the Commonwealth Edison Co.'s service is 31.2 cents. A load curve was given, showing that the average demand of twenty private garages was 142 kw-hr per month.

Like several of the other large city systems, the Commonwealth Edison Co., it may be added, practises what it preaches. Its line wagons may be referred to in this respect. In its service and repair work, it makes use of a number of specially designed electric trucks, each of which is a veritable supply store. Doors which let down at the sides give easy access to the numerous compartments with which the truck bodies are equipped, so that all tools and supplies are readily reached from the sides of the vehicle.

Near the forward end on the left side of the truck body, is a group of some twenty pigeon-hole compartments for the drills, saws, wrenches, etc. Behind these are two large metal-lined compartments for the gasoline cans and furnace, and next comes a third full-size space in which are carried salt and water for the preparation of ground-pipe connections. At the rear is a second group of compartments and drawers for the solder, taps, primary cut-outs and such small hardware as bolts, screws, steps, washers, etc.

The long compartment on the right-hand side near the front provides for laying out rubber coats, boots, etc, at full length, to prevent cracking due to folding. The spaces below are for brackets and short braces. In the group behind the horizontal openings are drawers for the glass insulators. These have pins which support the insulators out of the way of injury to one another. The rear compartment contains knobs, strain insulators, spurs, belt tools, etc.

The side doors which close these compartments swing downward and serve as shelves for sorting material. On the uprights are racks for holding the ground-wire molding, ground pipes, cross-arm braces, etc. The inside of the body is approached from the rear by a pair of easy steps, and at the left of the end gate are eight trays of various lengths for framing bolts.

Forward in the body of the car are two pay-out reels of wire, and adjoining these there is space for carrying transformers. Coils of rope and extension ladders are carried on the side standards. The latter also support a frame over which a tarpaulin can be thrown in rainy weather.

The trucks were designed primarily for the installation of customers services from the overhead system, but they have also been found well adapted to repair work and line extensions which do not require pole setting.

One suggestive novelty is the portable showroom electric truck operated by the Denver Gas & Electric Co., which purchased an electric truck to operate between the warehouse and the company's salesroom. Upon receipt of the truck the idea was conceived that during the summer season it might be advisable to equip the truck as a complete gas and electric portable salesroom. On this truck there were then installed the various types of gas ranges handled by the company, water heaters and various kinds of electrical appliances, such as percolators, toasters, fans, curling irons, milk warmers, utility motors, washing machine, vacuum cleaner, chafing dish, electric iron, grill, and various other appliances too numerous to mention. From the storage battery in the truck the company was able to give a practical demonstration of the electrical appliances, making coffee, toasting bread, etc. for the information of the prospective customer. The truck was manned by the driver and two salesmen doing team work, and thus closing many prospects which the one salesman might have been unsuccessful in securing.

This truck is used principally in the suburban towns, ofttimes following the gang of men who are laying gas mains in those districts. As a result of following up these extensions carefully, practically every consumer is induced to install a gas range. A particularly interesting feature of this innovation was the fact that almost all the ranges sold were of the cabinet type, high-priced stoves. The men were enabled to make about 40 calls per day with the truck, and practically every day at least 10 ranges were sold, and frequently a greater number. Thus the truck was a great saving, as prior to its equipment it had been planned to open a suburban branch office showing the line of ranges, water heaters and electrical appliances; and this expense was materially decreased by the operation of the truck.

A feature was made of driving the truck through streets where it was proposed to make gas and electric extensions, and, in this way, it created considerable interest and a desire for the appliances, and made it much easier to secure service applications.

A small ladder was carried to be placed at the back of the truck when stationary, making it easily accessible for the ladies to climb, and enabling them to observe at close range the various appliances in operation. Imitation is ever the sincerest form of flattery, and the success of the company in the operation of this truck in making friends, as well as in making sales, led several of the local hardware dealers to duplicate the scheme with a horse-drawn vehicle. But the truck made a splendid showing in efficiency in traveling over streets and roads which, on account of their torn-up and bad condition, were impassable with a horse-drawn vehicle.

The men had many interesting experiences, some of which were rather amusing.

In one instance the lady told them she would buy a range if they would find a buyer for some chickens she wished to dispose of. The driver of the truck agreed to take them and the sale was closed. The chickens were placed in the tool box of the machine and occasioned much laughter through cackling very loudly as the truck drove along. Upon reaching the garage and opening the tool box three fresh eggs were found—unearned increment. In another case the men found the lady of the house chopping down a tree. One of them finished the task while the other sold her a range, after which, by team work, they added a water heater to the sale. One of the men took care of a baby while the mother went out to the truck to make her selection of a range.

ELECTRIC HEATING AND COOKING

This department of central-station work continues, of course, to make satisfactory progress in so many departments, that incidental reference can only be made to a few of them. The practice of the Hartford (Conn.) Electric Light Co., may perhaps be taken as typical of some of the work in this field.

The company furnishes energy for operating electric heating and cooking apparatus upon a contract rate of three cents per kw-hr on a guaranteed minimum payment of $1 per month. This schedule is applicable to residences, to include such other household appliances as flat-irons, cleaners, etc, as may be desired in addition to the cooking apparatus under the contract rate.

Special attention is being given by the company to industrial electric-heating service, and extensive experiments are being conducted in this field in its private laboratory to determine the energy consumption and most economical methods of handling equipment under commercial conditions, including lines of fireless-cooker or storage-stove service. Among the representative industrial electric-heating installations on the system, that of the Gray Telephone Pay Station Co. is of much interest. In the japanning department of this concern are now five electric ovens occupying a space 26 ft long, 6 ft wide and 7 ft high, each having adjustable shelves and being operated between the hours of 10 P M and 6 A M on the night-power schedule. The total connected load of these ovens is 43.5 kw, the sizes ranging from 4 kw to 21 kw. All are supplied with single-phase current at 220 volts and are run at an interior temperature of about 300 deg. fahr. The ovens are provided with from one to two 5-in vent outlets discharging into a 14-in trunk duct carried above the battery, but in a new installation to be made in the near future, in a new building to be occupied by the concern, it is planned to run the ovens only an hour on the vent piping when starting up, the outlets then being cut off through the operation of a time switch. It is found that with electric heating no danger of fire exists, whereas with the use of other heat serious results are liable to occur at any time.

The ovens are each controlled by a switch and circuit-breaker mounted upon a small switchboard in the japanning department, and an electric time switch is installed on this board to close and open the breakers at the designated hours. It is found that a better finish is given the product.

Other equipments are of interest, as in a printing office, where the heat is applied to the ink at a stage in the process of raised or embossed printing, which enables the product to be turned out at a much reduced cost, compared with die engraving. In another case the current is used in heating the wax thread on stitching machines in a saddlery. The same work was formerly done by steam at 40-pound pressure distributed through one-eighth-inch copper tubing.

In a brief article on the value of a cooking load, Mr. R. B. Mateer gives some striking data and makes some suggestive remarks, as follows: "With a view of stimulating interest in electric cooking the accompanying table is presented, giving consumption and cost data gained from a year's practical experience in a household using electricity for lighting and cooking purposes and gas for water heating. Electricity for lighting was sold at 7 cents per kw-hr and for cooking purposes at 3 cents per kw-hr, while the price of gas was 90 cents per 1000 cu ft.

"The characteristic results presented in the table afford some idea of the value of such combination service as supplied to the average home. They suggest also the possibilities obtainable were the electric range more generally pushed—not as an auxiliary, but as an all-year-round appliance. The twelve-month period covered is sufficient to demonstrate the value of a cooking and heating load as compared with the consumption of the average residence consumer for illuminating service only.

"It will be noted that while only 287 kw-hr were required for lighting, 2441 kw-hr were consumed for cooking purposes. This cooking consumption occurred, furthermore, at an annual load-factor twice that of a purely lighting load. Again, the annual gross receipts were only $20.95 for the customer's lighting service, while for his cooking even at the 3-cent net rate $73.23 was assured. The amount actually collected was, however, $92.87, since the absence of an authorized heating rate necessitated the use of the "power" schedule with its high minimum of $6 per month based on the connected heating load. The connected load for lighting was 1000 watts. That for heating was 750 and that for cooking 4400, a total of 5150 watts, but the maximum demand never exceeded 2225 watts.

COST OF ONE YEAR'S DOMESTIC ELECTRIC COOKING AND LIGHTING, WITH WATER HEATED BY GAS

Lighting		Cooking		Water Heating	
Kw-hr	Amount	Kw-hr	Bill Rendered	Cu Ft	Amount
9	$0.63	...	....	1,100	$0.99
37	2.59	149	$6.40	4,800	4.32
37	2.59	289	8.67	6,200	5.58
45	3.15	390	11.70	10,400	9.34
35	2.45	414	12.42	6,300	5.62
27	1.89	331	9.93	5,000	4.50
26	1.75	325	9.75	6,400	5.76
24	1.47	195	7.00	4,000	3.60
48	1.25	88	7.00	4,100	3.69
15	1.05	118	7.00	3,500	3.15
15	1.12	86	7.00	3,600	3.24
11	1.00	55	6.00	2,100	1.89

"Day circuits suggested the development of industrial load. Aggressive sales engineering secured revenues far in excess of the early expectations of the office managers of utilities. Judging the future by the past, will it be the insistent demands of agressive citizens for service that is efficient and convenient, or will it be the awakening of public utilities to the investment already tied up in their residential circuits which, idle in daytime, may be made good revenue producers—that will bring about the wider development of cooking and heating service?"

An application of electric power which is highly appreciated by housekeepers is the drying closet, used in connection with the laundry. Such a closet, as described by Prof. F. C. Caldwell, of Ohio State University, Columbus, in his paper on electrical applications before the Ohio Electric Light Association convention, July 16, makes use of an electric fan to blow heated air through the closet. The heating is usually done with gas, though in the matters of both safety and convenience and in the dryness of the air, electrical heat is much to be preferred. Such drying closets built of steel can be purchased, but very good results can be obtained from an ordinary closet properly fitted up. Professor Caldwell has had one in his own home for several years, he said, and it has proved most satisfactory. The mangle, or ironing machine, motor-driven and electrically heated, is another laundry helper that deserves more consideration than it has so far received, he said. Here again it is a problem of demonstrating its applicability to the ordinary household.

At the New York Electrical Show last fall the popular interest in electric heating and cooking was shown in a very significant manner by the crowds frequenting the electric grill and tea room, operated in connection with the exhibit of the New York Edison Co. The food was all cooked by electric apparatus, including a hotel range, a grill and two ovens. To serve the people patronizing the place it was necessary to operate the range at its full capacity from 9 A M until 10 P M. On several occasions 75-lb roasts were cooked. The average day's work consisted of roasting 30 pounds of beef, baking half a bag of potatoes, broiling about 250 chops and 200 young chickens, and keeping soups and other foods warm. Approximately 600 people were served from the electrical kitchen daily. The range used is provided with two roasting ovens and a top cooking surface comprising eight rectangular hot plates. The ovens are 18 in wide, 16 in high and 28 in deep. They have double walls and are insulated with navy "firefelt" placed between the walls to prevent the escape of heat. The compartments are ventilated by means of flues which communicate with an opening in the top of the range. Each oven is provided with two calorite heating units of the two-heat type, one being located at the top and the other at the bottom, thus giving a range of four heats for each oven with power consumption for the respective heats amounting to 1.6, 2.4, 3.2 and 4.8 kw.

The eight rectangular hot plates are all of the same size, 9.25 in wide by 12 in deep, and the heating unit of each is designed for but one heat. The power consumption of each of the four front units is 1600 watts as they are designed to develop a high temperature for rapid work, while that of the back four is 800 watts, rendering them suitable for slow boiling.

The main circuit is closed through a double-pole circuit-breaker, and in addition the circuits to the individual heating units are protected by fuses and controlled by knife switches. Switches, fuses and circuit-breakers are mounted on a slate panel located at the top of the range and inclosed in a sheet-metal compartment provided with a roll-top door. The heating unit which each switch controls is indicated by a name-plate placed directly above the latter's handle, so that to ascertain what units are in operation one has only to roll up the door and glance at the switches. An aperture at the bottom of the compartment insures circulation of air over the panel devices. Conductors are brazed to the heating units, so that there are no connections that are likely to work loose from alternate heating and cooling. These conductors are carried through conduit to the connection blocks and there connected to the terminals of the respective power circuits.

The framework of the range is substantial, being constructed of angle-irons firmly bolted together. The range front and the door frames are of heavy steel plate, while the hot-plates and end frames of the panel-box are iron castings. The walls of the oven are of sheet metal. All sheet-metal parts are of blued steel, while the other parts are finished in marine or dull black. The heating units are replaceable and the design is such that the hot plates can be raised up to permit cleaning the catch pan located below them.

In London, it is worth mentioning, there are now restaurants where all the food is cooked electrically and they are so advertised. Personal experience on the part of the Committee within the last six months would indicate that they are well patronized. There are other London restaurants where electric cooking is quite a feature, as for example, Romano's famous place on the Strand. From its reported figures, it appears that to grill by gas costs $365 per annum, with gas at 62 cents per 1000 cu ft, while to grill by electricity costs something less than nothing, for, in fact, there is a profit of $10.87 on the sale of fat, with current at 2 cents per kw-hr. At Romano's the fat drops, not into the fire, as is the case with a coke grill, but into a special drip tin which is protected from the heat. There it coagulates and is collected, being afterward sold at a market price of 16 cents per lb. Thus not only is much unpleasant smell and noise, inseparable from other methods, avoided—one of the features of this grill being the quietness of its operation—but the operating costs are actually less than nothing, even after standing charges and meter rent have been allowed for. This particular equipment is in use in the aggregate for nearly twelve hours a day.

At the Cedar Point convention of the Ohio Electric Light Association last summer an interesting talk and demonstration of electric cooking by the stored-heat principle was given by Mr. M. E. Turner, contract agent for the Cleveland Electric Illuminating Co. The cooking outfit on exhibition during the convention consisted of one 300-watt range, two 300-watt stoves and one 200-watt compartment cooker. Ten of these sets had been distributed among as many central stations in the United States for demonstration purposes. The outfit shown was installed and used in Mr. Turner's home in Cleveland for three months, during which time all of the family cooking was done by means of electricity. The continuously connected stove is about the size of an ordinary gas range, and contains an oven but no griddle heaters. The oven interior is lined with an iron casting about 1 inch thick, which stores the heat received during twenty-four hours of the day from a heating cartridge inserted from the back of the range and sealed to prevent heat radiation. Between the casting and the outer casing of the stove there is placed about 2 or 3 inches of heat-insulating material. At the top of the oven is a broiling device which consists of a 1100-watt grid-heating unit. The switch controlling the broiler is located under the oven door in such a position that the latter cannot be closed without shutting off the broiler element, the heat of which might prove destructive in the tightly closed oven. With continuous supply of energy to the regular oven heater, a temperature of 600 deg. fahr. is maintained in the oven.

Each of the two 300-watt stoves are vertical cylindrical bodies containing about 190 lb of cast iron apiece, which is used to store the heat continuously supplied by the heating unit placed near the bottom of the stove. The casting terminates at the top of the stove in a sort of griddle on which the various cooking utensils can be set. When the stove is not in use a hinged insulated cover prevents radiation of heat from the iron casting.

The compartment cooker is in outward appearance similar to the stoves, but when the insulating cover is raised, the cavity in which to set the compartment cooking utensils can be seen.

In one noteworthy type of electric fireless cooker brought out during the past year, so little current is required it can be operated from the ordinary socket. While the cooker operates on the heat-storage system, the lining of the oven is not made of any substance which will absorb a large amount of heat. The insulation is so arranged that valuable time is not consumed in attaining the temperature necessary for cooking.

The cooker measures 17.5 in wide, 18 in deep, 22.75 in high, outside measurements; 9.5 in wide, 10 in deep and 12 in high inside measurements. The outside casing of the cooker is of blued steel with nickeled corners, legs and handles. The lining consists of one piece of drawn aluminum without seams or crevices. Between the lining and the casing is a space which is filled with heat-insulating material. On the front of the stove is a door which swings outward, having two clamp levers which lock it tightly so that there is very little chance for heat to escape. The door is also aluminum-lined and filled with the same heat-insulating material.

The heater of the cooker consists of four units, made of pressed steel, each containing separate heating elements. The four heating elements are clamped in a pressed-steel frame which is installed in a compartment directly below the cooking pan. With the added radiating surface, which is obtained by dividing the heater into four units, it is asserted that the time required to bring the oven to a working heat is considerably reduced below what would be required with the ordinary disk-type heater. In addition, no energy is required to raise the temperature of intervening air spaces or storage plates.

Three aluminum cooking utensils are furnished with the outfit. One is a 7-quart seamless aluminum dish with cover, which can be used for roasts, stews, etc; the other two are 3-pint pressed aluminum dishes used for cooking vegetables and baking bread, etc. These three dishes can be used at the same time.

On the bottom of the outside of the cooker is a dial which operates a thermostatic temperature control. By means of this dial the maximum temperature at which the oven operates can be regulated, and the energy is automatically shut off as soon as this temperature is attained. This automatic control insures the heating element against any damage from overheating. If desired, the heating element can be used for frying purposes by leaving the oven door open. The oven consumes 600 watts, or about as much energy as an ordinary electric flat-iron.

According to a test made by the manufacturer of this fireless cooker, it required 1 cent more to cook a 5-lb roast of beef in the cooker than it would in a gas oven, but the elimination of shrinkage occasioned by the use of the electric cooker more than offset the extra cost of energy.

In a gradual but not sensational way the electric heating of homes and larger buildings is being taken up, especially on the Pacific Coast and in the Northwest. In Idaho, where a number of dwellings and other structures are heated electrically, it is the practice to allow at least 10 kw for the average house of five or six rooms. Used continuously such a 10-kw heating equipment will consume 240 kw-hr per day, or 7200 kw-hr per month. In the Western States where surplus water-power is running to waste several companies have offered special house-heating rates as low as $16 per connected kw for the winter season, making the cost of heating a dwelling of the type above described about $160 per season. Compared with coal at $6 per ton this cost is not excessive. The energy furnished under the above season schedule is, however, sold at a rate of less than one-half cent per kw-hr.

RAILWAY ENERGY SUPPLY AND INDUSTRIAL POWER

Last October in the *Bulletin* of the Association, the Committee on Progress presented a survey or estimate of the mechanical horse-power in use in the United States. The table herewith was given, compiled with help from various quarters, including that of a distinguished statistician in another field of public utility, and it is believed that the data approximate the truth, with a pardonable error one way or the other. They open up a wonderful vista, and invite all kinds of criticism and discussion, the outcome of which can only be beneficial and fruitful to our industry. We may not be the "heir of all the ages," as that identity has never been established clearly in any detective literature, but we are undoubtedly somewhere in the line of succession.

Table of U. S. Mechanical Horsepower

Manufacturers		
Steam	16,400,000	
Water	1,900,000	
Other	1,100,000	
Total		19,400,000
Central Electric Light and Power Stations		
Steam	5,000,000	
Water	2,600,000	
Gas	100,000	
Total		7,700,000
Street and Electric Railways		
Steam	3,100,000	
Water	300,000	
Total		3,400,000
Steam railroads (locomotives only)		50,000,000
Steam and naval vessels		4,000,000
Mines and quarries		5,000,000
Custom flour, grist and saw mills (not included in U S Census of Manufactures)		1,000,000
Irrigation		400,000
Total		90,900,000
Automobiles		22,500,000
Total including automobiles		113,400,000

The closeness of these figures may be guaranteed in a way by the fact that the United States Census figures for central stations in 1912 show a total of 7,526,938 horse-power and those of the electric railways 3,680,051, or a grand total of 11,206,989. The estimate in the table is within 100,000 horse-power of the Census reports or only 1 per cent out of the way. Some other facts stand out. Adding another 3 to 5 millions for isolated plants, giving a total of about 120,000,000 horse-power, it may be noted that the mature horses and mules of the United States numbered 25,000,000 in the last Census and may be taken at 30,000,000 to-day. The total of all is 1½ horse-power per capita, roughly, for our entire population, of which animal power is already only one-fifth. Steam, however, is one-half of the total 150,000,000 horse-power, and steam locomotives stand for about two-thirds of the 75,000,000 horse-power. That way lies our opportunity of incalculable extent, as also in the automobile field, or the street-railway field, which already, in 1912, with an output from its stations of 6,052,359,008 kilowatt-hours purchased from outside sources 2,967,658,781 kilowatt-hours—about one-half of its energy requirement.

A large amount of central-station energy is shown by these striking figures to be supplied already to street railways, and it seems quite inevitable that the proportion should increase until the respective totals are reversed, or the generation of current by separate plants for transportation is wiped out entirely as uneconomic and inefficient. In like manner there is a growing conviction that in the coming electrification of steam-railroad terminals or main lines there is no need for separate plants, for all the needed energy can be fed into the system by local lighting companies or power-transmission systems, all along the line. There may be limits to this, but the broad sweep of the generalization is not to be denied.

Revised contracts covering energy supply during the remaining life of the Chicago railway companies' franchises were executed in 1913 between the Commonwealth Edison Co., on the one hand and the companies operating the elevated and surface railways on the other. Under these contracts, as a result of the more efficient use of generating and distributing equipment provided for, energy is furnished to net a lower price than before, while at the same time more reliable service is given. The Commonwealth Edison Co., has consistently maintained the position that it is uneconomical to supply the various energy needs of the same territory by means of more than one system of electrical transmission. For several years past the company has supplied all of the energy requirements of the Chicago City Railway surface system and part of those of the Chicago Railways (surface) and of the elevated railways. The railway portion of the output of the Edison Co.'s power plants has thus rapidly increased until it is now 70 per cent of the total. These plants have been enlarged to care for the increased demand, while the few existing railway generating stations are being gradually put out of commission.

The Edison Company, has been supplying 25-cycle, 3-phase energy at 9000 volts pressure to substations owned and operated by the railway companies. In addition, it has operated substations in the same territory, transforming the high-voltage, 3-phase alternating current into 4000-volt, 3-phase form for distribution by the 4-wire system, and to 2300 volts, single-phase for distribution to lighting and industrial power circuits. The latter substations have been connected with the power plants by underground cables entirely distinct from the railway cables. The surface railway lines have also required transmission lines and substations separate from those of the elevated lines. The results of this duplication are that an excessive number of expensive substations have been required. Second, and possibly more important, the load-factor of the cables has been low and the cost of cables and conduit correspondingly large. Third, the unnecessarily large number of cables has increased the tendency to electrolysis. The new contracts remove the necessity for this duplication. They are modifications of the contracts under which the railways have been operating for some years and have been framed not only with a view to greater efficiency under existing conditions, but to provide the city with possible management by the city or its lessee. It is assumed further that at any time the steam railways having terminals in Chicago may electrify them and may desire to purchase energy from the Edison Company. Hence the articles of the contracts are carefully worded to permit the company to use its generating and distributing equipment for all of these purposes, if able to offer satisfactory prices for energy.

In the amended contract with the Chicago Railways Co., the maximum demand for any month is calculated from the heaviest hourly morning and evening loads on three consecutive days, so selected as to yield a total energy consumption for the six hours greater than would be obtained as the total of the corresponding six hours on any other three consecutive days.

The minimum increases automatically and for the surface lines has already reached 110,000 kilowatts and for the elevated lines, 43,000 kilowatts.

To provide for the extra energy which may be required for heating cars in extremely cold weather, the "emergency energy" consumed when the temperature of the air is at or below 15 deg. fahr. is excluded in determining the maximum demand.

The second part of the contract covers the scale of prices for energy. This, as before, is made up of two parts, but a sliding scale is provided for both primary and secondary charges. These are shown in Tables I and II. These charges are subject to a

TABLE I—PRIMARY OR POWER CHARGE

Maximum Demand	Primary Charge per Kw
First 30,000 kw	$1.25
30,000 to 60,000 kw	1.00
60,000 to 90,000 kw	0.917
90,000 to 120,000 kw	0.875
Above 120,000 kw	0.833

correction for the price of coal. If during any two-year period the price of coal having a heating value equivalent to that of coal from mines in Central Illinois delivered at the storage yards of the Edison Co., exceeds on the average $1.90 per ton, the railway company shall pay an extra charge to cover this excess. The correction in dollars is obtained by dividing by 1000 the number of kilowatt-hours delivered during the two-year period and multiplying this by the excess price of the coal. On the other hand, if the cost of the coal is less than $1.40, the electric company is to pay to the railway company a sum calculated as above.

TABLE II—SECONDARY OR ENERGY CHARGES

Monthy Energy Consumption	Charge per Kw-hr in Fractions of a Cent
First 5,000,000 kw-hr	0.400
5,000,000 to 10,000,000 kw-hr	0.395
10,000,000 to 15,000,000 kw-hr	0.390
15,000,000 to 20,000,000 kw-hr	0.385
20,000,000 to 25,000,000 kw-hr	0.380
25,000,000 to 30,000,000 kw-hr	0.375
30,000,000 to 35,000,000 kw-hr	0.370
35,000,000 to 40,000,000 kw-hr	0.365
Over 40,000,000 kw-hr	0.360

As so far described the new contract differs only in detail from its predecessor. The next feature, however, is designed to effect transmission and distribution economies and involves the joint use of substations by the two companies or the erection of substations by the lighting company alone. As at present the railway company will own and operate at least a part of the required substations, but if there is in these ample space for the equipment required by the lighting company for its lighting or other business, such equipment may be installed under terms mutually agreed upon. This equipment may include rotary converters for 600-volt service, and the Edison Company agrees that if it has available capacity in the transforming equipment it will sell direct-current energy to the railway company for use in the vicinity of the substations. The Edison Company further agrees to install substations where needed or required and to sell direct-current energy, under the same general terms as alternating-current energy, with an additional charge for conversion and for a share of the cost of maintaining the substation based upon the proportion of its output by the railway company.

The advantages of the new arrangement are partly these: From one substation it will be possible to supply service for all purposes, including railway energy for different companies occupying the same territory. For example, the elevated and the surface roads which now have separate systems of substations can be supplied from one system, thus greatly reducing the number of substations required. A reduction in number of substations renders the transmission systems simpler and thus more reliable and at the same time cuts down transmission cost.

The railway company has agreed to generate no electrical energy during the period from November 1, 1914, to January 31, 1924, but reserves the right to do so after that date. In resuming generation, however, it is provided that Edison service shall be used in such amount as shall insure an average monthly load equal to 35 per cent of the amount which the lighting company must, under the contract, stand ready to supply.

The new contract differs from the old one in that the energy will be metered in alternating-current form at the high-tension terminals of the transformers in cases where the railway company operates the rotary converters, and otherwise at the points where service is delivered to the direct-current feeders.

Looking forward to a possible consolidation of the railway systems of the city, the contract provides a new maximum scale of charges for use in such a contingency. These are similar to the ones already tabulated except that the rates apply to different ranges of consumption as follows: Primary or demand charge, $1.25 per kw, up to 75,000 kw; $1, excess to $150,000 kw; $0.91, excess to 225.000 kw; $0.875, excess to 300,000 kw; $0.833, excess above 300,000 kw. Secondary or energy charges are 0.4 cent up to 12,500,000 kw-hr per month; 0.395 cent for excess to 25,000,000 kw-hr; 0.390 cent for excess to 37,500,000 kw-hr; 0.385 cent for excess to 50,000,000 kw-hr; 0.380 cent for excess to 62,500,000 kw-hr; 0.375 cent for excess to 75,000,000 kw-hr; 0.370 cent for excess to 87.500,000 kw-hr; 0.365 cent for excess to 100,000,000 kw-hr, and 0.360 cent for excess above 100,000,000 kw-hr.

The remaining features of the contract involve provisions for arbitration in case of dispute as to service and charges, method of measuring and checking all physical quantities upon which charges are based, notification of proposed changes in demand for power on the one part and of ability to supply power in excess of contract stipulations on the other, and other details necessary to the satisfactory operation of the agreement.

The new contract has been in force for several months but has just been made public. The operation is very satisfactory and is already resulting in marked economies in construction and operation of substations.

The Chicago City Railway Co. has used Edison energy exclusively for nearly five years. Its original contract covered a five-year period. The new contract is, therefore, in the nature of a renewal. The railway company, however, obtains a better rate for energy and, by agreeing to the joint use of substations, co-operates in securing the economies already described. The terms of the contract are virtually the same as those of the Chicago Railways' contract.

The Commonwealth Edison Co. has supplied an increasing proportion of the energy required by the five elevated railways, but the railway companies having several power plants of varying degrees of excellence, have continued to operate the most economical of these in order to keep down the service charges and to insure an extra source of energy supply. They have now, however, agreed to take the entire quantity from the lighting company for a term of twenty-five years. The principal feature in which the elevated contracts differ from the others is the provision made for the leasing by the Edison Company of all power plants and substations at rentals so graduated as to cover natural depreciation of buildings and equipment. By thus controlling all of the electrical equipment the electric company will be able to operate the steam plants or not as may prove more economical, and can utilize the substations in the general distribution scheme already outlined.

In the operation of the power plants and substations the lighting company agrees to maintain the equipment in good running order and to pay the taxes assessed against the property. The railway companies are to supply coal-handling and ash-handling service for the power plants, for which service a reasonable charge is to be made. The railway companies guarantee, however, that the cost of such service and of maintaining a satisfactory supply of water for condensing purposes shall not exceed these costs at the beginning of the contracts. The lighting company has the option of purchasing the power plants, substations and equipment on a scale of prices graduated according to years and allowing for depreciation, but at the same time either party may release the generating stations from the lease.

The lighting company also is given the right to install wires and cables upon the elevated structures, with the necessary poles and cross-arms, provided that these do not interfere with the use of the structures for railway purposes.

The Edison Company is to furnish direct-current energy at 600 volts, and as the original contract was draw in terms of alternating-current energy, the alternating-current equivalent of the direct-current energy is calculated on the basis of transformation efficiency at 93 per cent. The following additional charges are made for transformation: Primary or demand charges 30 cents per kw-hr up to and including 10,000 kw; 26 cents for the excess between 10,000 kw and 20,000 kw, and 23 cents for the excess over 20,000 kw. The railway companies also pay a proportional share of the cost of operating the substation and an energy charge of 0.025 cent per kw-hr for all energy delivered.

A new railway contract announced during the past year was one between the Cleveland Electric Illuminating Co., and the Cleveland Railway. The service charge is graduated, varying from $1.475 per kw of monthly maximum demand for the first 500 kw to $1 for excess above 1000 kw. The unit charge is graduated from 0.95 cent per kw-hr for the first 50,000 kw-hr per month down to 0.38 cent per kw-hr for excess above 2,300,000 kw-hr per month. These figures are based upon 90 per cent power-factor, the railway obtaining the benefit of increased power-factor by corresponding reduction in rates. A table given in the contract shows that with a consumption of 9,000,000 kw-hr per month, 50 per cent load-factor and 90 per cent power-factor, the cost is 0.681 cent per kw-hr. The rates are based upon a minimum demand of 15,500 kw, which may be increased by due notice. The monthly maximum demand in the Cleveland contract is calculated from the sum of the kilowatt-hour consumption during the peak-load hours on three successive days. These hours are integral hours, that is 5 to 6 P M, or 6 to 7 P M, and the sum of the kilowatt-hours during these three peak-load periods is to be greater than that of any three similar periods during the month. One third of the total consumption during the three hours is the maximum demand for the month.

Two new contracts in the year were between the New York Edison Co., and the Third Avenue Railway Co., in New York City, and between the Philadelphia Electric Co., and the Philadelphia Rapid Transit Co. The former contract presents an interesting contrast to the Chicago contract. In the Chicago case the old steam plants were not taken over by the Edison Company, but were either shut down or are still being operated by the railway companies. These steam stations will probably not be remodeled but will be allowed to become obsolescent and will gradually be eliminated. The case of the Third Avenue Railway contract in New York, however, is quite different. This company less than ten years ago put in a very modern plant consisting of eight vertical, cross-compound engines of 5000 hp each, with 6600-volt, 3-phase, 25-cycle alternators. With the exception of the use of reciprocating engines this plant is quite up-to-date at present, and is operating very economically. The New York Edison Company has taken over this plant and will operate it in conjunction with the Waterside stations, which have generators of the same voltage and frequency.

The latest contract of all is that in Philadelphia, and it presents some interesting features in that it is divided into several parts. Energy is to be furnished by the Philadelphia Electric Co., in alternating-current form, as well as in direct-current form. The electric-light company takes over, at a nominal rental, a substantial part of the generating equipment of the railway company and may operate this as an emergency reserve. The electric-light company has also the privilege of utilizing its own equipment if it so desires. The load-factors guaranteed are 35 per cent in one part of the system and 30 per cent in another. The minimum demand of 15,000 kw, would be increased by 5000 kw during the fall of 1913. It is interesting to note also that the Philadelphia Electric Company has also taken with prompt readiness the service of energy to the Pennsylvania Railroad for its suburban extensions to Paoli. It is all natural and inevitable.

PUMPING AND ICE MAKING

The street and electric railway field is, however, but one part of the larger opportunity. At a meeting of electrical men in Boston on December 5th, some of the other figures in the foregoing table (p 123) were confirmed by Mr. S. St. John Morgan in a paper on the industrial power market in America, stating that in 1910 there were 22,000,000 total mechanical horse-power in use in the United States, of which 22 per cent was supplied by electric motors. He estimated that by 1920 a total of 44,000,000 horse-power will be in use and that 60 per cent of this will be electrical. The opportunities in a single city like Fall River, Mass., where 120,000 mechanical horse-power is in use in the textile mills, are most attractive. In this one moderate sized city the possible load for electrification exceeds the total power load of many of the largest central-station systems. In the Boston metropolitan district there remain to be electrified at present 186,000 mechanical horse-power.

It is significant of the inroads being made on this territory that the electrical journals now have to find something very special in industrial power for treatment in an article, and that a very large proportion of the data accumulated by our Commercial Section for the use of salesmen and canvassers relates to power uses.

Electrical pumping has more lately been picked out as one of the likely fields of electrical energy consumption, with heavy use of current and large, steady load-factor. There are, broadly, two classes of work, ordinary pumping for regular water supply, and emergency pumping for fire purposes. Thus in order to provide increased protection against fire for the congested business district of Boston. Mass., it has been decided to erect a high-pressure central pumping station between the Boston Common and the Public Garden, from which will radiate a system of special high-pressure water mains, covering that entire district and devoted exclusively to fire service. In case of fire in this district, the alarm will be sounded in the pumping station and the fire houses simultaneously, and within forty-five seconds a pressure of 300 lb per square inch will be put on the system. This will do away with the necessity for fire-engine service and only the hose lines will have to be brought to the scene of the fire. The contract calls for six 3000-gal. per minute, six-stage centrifugal pumps; six 700-hp, 6000-volt, 60-cycle motors; six 13,200-volt 25-cycle, 800-hp motors, with switchboard and controlling apparatus, traveling cranes and all heavy piping and large valves necessary for the complete equipment of the station. Each pump will be connected by a magnetic coupling on one end to a 700-hp, 60-cycle motor, and on the other end to a 800-hp, 25-cycle motor. Under normal operation each pump is driven by the 60-cycle motor, drawing energy from the lines of the Edison Electric Illuminating Co. of Boston. However, should any mishap occur to the 60-cycle supply the pump can be instantly operated by its 25-cycle motor, fed from the lines of the Boston Elevated Railroad Co. The motors have wound secondaries, and do not start until the first point of the automatic controller has been passed. At this point, the circuit of the magnetic clutch between the motor and the pump, is completed. A potential of 13,200 volts was contemplated in the design of the 800-hp motors and is the highest ever used in a motor with a phase-wound secondary.

The 8,000,000 gallons of water used daily in the city of Utica, N. Y., is obtained from two natural watersheds, one north and the other south of the city. From these points the water is conducted through 20-in mains and by direct intake to three reservoirs above the city, 218 ft, 200 ft, and 254 ft, respectively. Their capacities are 200,000,000 gal, 40,000,000 gal and 284,000,000 gal. By drawing water from reservoir No. 5 only, the heads provided by the northern and southern supplies "balance" very closely so that a uniform city pressure is obtained. In order to take advantage of this condition an electrically operated plant was installed to pump the water from reservoirs Nos. 2 and 5. The equipment consists of three motor-driven centrifugal pumps. One is a 10-in, single-stage, single-side suction pump, having a rating of 3500 gal per minute against a 60-ft head. This pump is driven by a 100-hp induction motor operating at 690 r p m. The second unit is a 10-in, 3500-gal, single-stage, double-suction centrifugal pump directly connected to a 75-hp induction motor. The third pump is a 5-in, single-stage, double-suction centrifugal unit rated at 700 gal per minute at 150-ft head. This pump is directly driven by a 50-hp induction motor. The motors operate on a 2-phase, 60-cycle, 220-volt circuit of the Utica Gas & Electric Co. The piping is so arranged that the two 10-in pumps can be used to take water from either of the two lower reservoirs and discharge it into the higher one, or they can be used as booster pumps discharging directly into the city mains.

The automatic electrically operated pumping plant which furnishes both the water supply and fire protection for Farmington, Mich., a typical village in a farming community, was described by Mr. A. R. Cary, of the Eastern Michigan Edison Co., before the 1913 convention of the Michigan Section, N. E. L. A. The equipment employed is of a type especially suitable for service to villages and small towns and was installed in 1912. Water is obtained from two wells 170 ft deep, one being 3.5 in in diameter and the other 8 in in diameter. From the large well the supply is pumped into a cistern or reservoir under the pump-house, while from the smaller bore the water is delivered directly into a pressure system. A pressure tank with a capacity of 13,000 gal is used, although as normally operated the supply held in the tank is only 10,000 gal or less.

The pumping equipment installed consists of: (1) a 5-hp 220-volt, 3-phase motor running at 1140 r p m, which drives through gears a deep-well pump operating from the smaller well, at 45 strokes per minute, with a 12-in stroke; (2) a 7.5-hp, 220-volt, 3-phase motor running at 1720 r p m, which drives through gears a deep-well pump operating from the larger well, at 46 strokes per minute; (3) an air-compressor driven through gears by a 3-hp, 220-volt, 3-phase motor running at 1720 r p m and discharging into the pressure tank, and (4) a triplex, single-acting, geared fire pump driven by a 30-hp, 220-volt, 3-phase motor with a wire-wound rotor and slip rings, which runs at 860 r p m.

The small pump delivers continuously into the pressure system. If the pressure drops below 30 lb, the fire pump is automatically put into service and pumps from the cistern into the pressure system. If the water level in the cistern falls below a certain point, the pump working from the larger well is "cut in" and fills the cistern. When the use of water is small and the pressure is right, the smaller pump is also automatically put out of service.

No operator is needed in a plant of this kind. The village employs a man for a small sum to inspect the equipment and keep it oiled and in repair, which he can do in about one hour per day. The labor cost for operation is therefore negligible. As there is no electric meter on the gross water supplied, it is impossible to give any cost for the water pumped. The monthly bills for electric service, at 4 cents per kw-hr (less 5 per cent for prompt payment), have run as follows: $40.77, $40.33, $36.18, $31.77, $32.42, $39.94, $48.34, $48.37, etc.

All water is paid for by meter. There are forty-eight consumers at present, but many more are being added. The minimum charge of $1.50 per quarter allows the consumer to use 9000 gal. When more water than this is used, there is a charge of 15 cents per 1000 gal for the next 10,000 gal, and a charge of 10 cents for all over 19,000 gal used.

Energy supply to operate this installation is received from Detroit over a 4600-volt, 3-phase line. This pressure is then stepped down to 230 volts by a 30-kv-a transformer located about 50 ft from the building. Four other similar pumping plants were being installed or prepared for in the State at the time of Mr. Cary's report.

Early this year it was stated that no less than 4841 horse-power in ice plants was then connected to the mains of the Commonwealth Edison Company of Chicago. Fourteen different plants owned by eleven companies had made contracts for central-station energy, the daily tonnage output ranging from 60 to 140 tons with a total of 1245 tons. In the largest plant motors rated at 564 horse-power had been installed. Such figures give a glimpse of the opportunities in this direction alone.

Mr. C. H. Stevens, manager of the power engineering bureau of the Edison Electric Illuminating Co. of Brooklyn, contributed a paper to the International Congress of Refrigeration in Chicago of great interest, entitled, "Artificial Ice-Making and Refrigeration from the Standpoint of the Central Station." The author said that it had only been within a comparatively short time that the field of refrigeration had received the specialized treatment from electric-service companies that it deserves. At the present time, however, several companies have reached the point where the word "super-specialization" would best apply as expressing the intensive manner in which they are going after the business. Some of the larger companies now employ refrigerating engineers to advise customers, so that the best economy and efficiency may be obtained. Mr. Stevens gave three reasons why these efforts are made. The first is the load-factor of refrigeration and ice-making, which is materially higher than that of the average business. In the second place electric-service companies believe that before long artificial refrigeration will be used, at least to some degree, in practically all types of buildings. They also believe that natural ice will soon be entirely superseded by artificial ice, in the cities at least. This development will require a tremendous amount of energy, and therefore opens up an almost unlimited field for the use of electricity. As central stations are, as a rule, in a position to produce energy more cheaply than individuals, they should be able to get this business if they are willing to sell the energy at a small margin of profit. This constitutes the third reason for the interest in the subject of central-station managers.

Data on twenty-five electrically-driven refrigeration plants supplied with central-station energy were given, as in Table I. These figures were summarized in relation to consumption of energy as shown in Table II. (Page 137)

In general, the energy consumption per cubic foot of storage room increases as the volume of the rooms and the size of plants decrease. The full storage plant is an exception, and this can be explained by the fact that the contents of the room are changed but once a year.

Up to about three years ago practically all ice plants of large size were operated by steam engines. This was due to the fact that usually the plants were making ice from distilled water, obtaining the greater part of the distillate from the exhaust from their engines. With this handicap of the engine exhaust to overcome, the central station did not consider the field of sufficient importance to adopt new rates to apply directly to this business.

At the present time, however, there are in this country at least twelve artificial ice plants of over 90 tons rating which are operating exclusively on lighting circuits, with the highest satisfaction as to efficiency and economy. The determining factors which brought about this change were the use of multiple-effect evaporators in connection with the distilled-water plants and the advent of the raw-water system of making ice, central-station rates applying directly to the latter system. The multiple-effect evaporator is an efficient piece of apparatus, and makes it entirely feasible to drive the compressors and pumps electrically and to produce the distilled water economically direct from the evaporators. The advent of the raw-water system was a still

Table I—Data on Refrigerating Plants

Name	City	Connected Hp	Tons	Cu Ft	Kw-yr	Kw-yr per Cu Ft	Temp. of Cooler, Fahr
Wholesale meat markets:							
Swift & Co.	Philadelphia	15	8	22,980	25,728	1.12	..
Schwarzschild & Sulzberger	Philadelphia	10	6	15,732	30,448	1.93	..
Armour & Co.	Philadelphia	25	15	21,384	42,636	2.00	..
A. Booth & Co.	Chicago	30	12½	23,190	30,456	1.31	20
Lake Superior Fish Co.	Chicago	10	7	7,690	14,880	1.93	20
Withheld	Pittsburgh	50	20	94,000	159,250	1.69	30
Packers:							
Vienna Sausage Co.	Chicago	30	15	4,340	6,000	1.38	36
Sulzberger & Sons	Pittsburgh	30	15	39,680	76,292	1.93	36
Kingan & Co.	Pittsburgh	30	15	37,450	171,144*	4.61	40
Schwarzschild & Sulzberger	New Orleans	30	15	54,500	51,372	0.944	35
Provisions:							
S. Ershowsky	New York	15	8	10,505	23,412	2.24	36
P. Ohl	New York	7½	4	2,004	10,503	5.2	34
John J. Felon & Co.	New York	10	4	38,880	25,783	0.665	38
C. Sehnek & Co.	New York	5	2	504	5,613	11.1	25
George S. Sloan	Chicago	10	6	2,600	10,620	4.1	20
George Middendorf & Co.	Chicago	15	8	8,820	12,204	1.38	41
Retail meat:							
J. J. Schnitzius	Philadelphia	15	8	3,000	9,949	3.3	35
N. Frey	New Orleans	7	2	1,490	4,600	3.1	..
Klein Bros	Chicago	15	8	4,629	26,808	5.8	36
Zambreno Bros.	Chicago	5	2	1,706	3,408	2.0	43
F. P. Bell	Philadelphia	7½	4	2,500	11,099	4.45	..
Fur storage:							
Balch, Price & Co.	Brooklyn	39½	20	56,775	19,760	0.35	30
Julius Klugman	New York	7½	4	5,722	1,931	0.34	20
H. Jaeckel & Sons	New York	15	10	33,120	23,000	0.70	16
C. G. Gunther's Son	New York	30	15	40,500	27,321	0.67	32

further advantage. In this system the obtaining of distilled water is a secondary and unimportant item, and with it the question of energy becomes simply a matter of rates, comparing various sources of energy.

Mr. Stevens explained the off-peak system of charging to show that this plan offers a method of obtaining still lower rates for the energy needed in refrigeration and ice-making. If the manufacturers of ice will shut down their compressors during the months from November to February between the hours of say 3 P M to 9 P M, the electric-service companies will be enabled to give rates that will make the operation of the electrically driven ice plant economical.

TABLE II—ENERGY CONSUMPTION OF ICE-MAKING PLANTS

Kind of Plant	Number Plants Averaged	Average Kw-yr per Cu Ft
Fur storage	4	0.51
Packers (meat)	4	1.41
Provisions (large dealers)	3	1.43
Wholesale meat (Middle West)	3	1.64
Wholesale meat (Philadelphia)	3	1.68
Retail meat	5	3.73
Provisions (small dealers)	3	6.80

Ice plants electrically driven from central stations have several advantages, as follows: First, continuity of service; second, saving in initial plant investment, ranging as high as 70 per cent in raw-water plants; third, increased facility for economical expansion of the plant; fourth, location of the plant at any point desired independent of fuel supply; fifth, saving of space devoted to boiler-house equipment and coal storage; sixth, entire elimination of the appearance of oil in the product; seventh, freedom from the worry and trouble of power-plant operation.

Most of the motors used are of the alternating-current type. Variable-speed motors have been used with success, but general practice seems to indicate that the greatest over-all efficiency, even at varying loads, is obtained by using a constant-speed motor. For driving the auxiliary apparatus electric motors are ideal because of their compactness, freedom from vibration and general adaptability to widely varying conditions.

In conclusion, Mr. Stevens gave some data on three electrically driven ice plants supplied by the Commonwealth Edison Co. of Chicago and the Cataract Power & Conduit Co. of Buffalo. These figures are summarized in Table III. (Page 138)

The average energy consumption for the three plants given is 46.89 kw-hr per ton of ice produced, and this has been found typical of American practice in modern electrically driven plants.

In a discussion of the paper, Mr. George H. Jones, of the Commonwealth Edison Co., made the point that the use of central-station energy enabled the ice maker to cut down the cost of cartage by locating his plant near the center of the area of delivery. The cost of delivering is a large item, and, where there is no fuel to be received at the plant, medium-size ice plants supplied with energy from the central station can be located at advantageous points to effect economy in delivery. Mr. Jones believed that 150,000 tons of ice would be made electrically in Chicago in 1913. Mr. McGinnis, of the Lincoln Ice Co., of Chicago, one of the customers of the Commonwealth Edison Co., gave central-station electricity a hearty indorsement. He operates an electric raw-water ice plant and made 27,000 tons in 1912, and expected to make 35,000 tons in 1913. He had no difficulty in competing with distilled-water ice, and believed that, on the average, raw-water ice is better. It is worth a good deal, he said, to have no cares of power-plant operation. He was an ice-maker, he said, not an energy producer, and was content to remain so.

TABLE III—SUMMARY OF REPRESENTATIVE ICE PLANTS USING CENTRAL-STATION POWER

Plant	Rated Capacity per Day, Tons	Total Connected Load, Hp	Yearly Ice Output, Tons	Annual Kw-hr	Average Kw-hr per Ton of Ice	Months of Operation
Knickerbocker Ice Co. 61st St. plant, Chicago	120	564	37,205	1,457,912	44.7	8
Webster - Citizens' Co, Buffalo, N Y	90	427	33,002	1,444,608	43.7	12
Lincoln Ice Co, Chicago	120	511	27,839	1,455,012	52.2	12

Another aspect of the ice and refrigerating problem is, of course, the supply of energy for localized work, and in that respect also there has been considerable development in relatively small refrigerating apparatus, whose dimensions and appliances have become even possible for an ordinary store or dwelling. Further refinements and possibilities along these lines are indicated, if not already attained. As an example it may be noted that up to November, 1913, the United Electric Light Co. of

Springfield, Mass., had installed 121.5 horse-power in motor-driven refrigerating apparatus since May 1st and then had on its lines a total connected refrigerating load of 459 horse-power. Twenty-eight customers are using this service, the individual plants ranging in size from 3 horse-power to 70 horse-power. Seven installations are rated at 20 horse-power or over each. The average rate is from 2 to 3 cents per kilowatt-hour on the regular power schedule. The company has not found it necessary to offer any off-peak rates for this business because the merchants served so far prefer to use their equipments at any time. The majority of the installations are equipped with automatic starting and stopping apparatus. Mr. Walter L. Mulligan, general manager of the company, reported the testimony of customers as indicating a saving of 40 to 50 per cent of their former ice bills.

Next to making ice or supplying the needed electrical energy for refrigerating apparatus, would come the cutting of natural ice by motors, a subject which has already received the attention of the Association. A marked advance over the customary methods of harvesting ice has been made at the Coes Pond, Worcester, Mass. In cutting ice prior to its haulage into the store-house, the usual plan is to form the blocks on the surface of the pond and to push them to the ice-house runway along a channel which is sometimes of such extreme length that the blocks freeze together before reaching the hoisting chain. The cutting is extremely tedious and the labor cost correspondingly high. At the Coes Pond establishment central-station energy supplied by the Worcester Electric Light Co. has been utilized, and the sawing of the standard cakes is all accomplished by a motor-driven plant situated within a few rods of the ice-house. By this means the services of twenty two-horse teams and forty men have been eliminated.

The plant consists of two sets of 36-in saws with slightly offset teeth, installed in an artificial channel about 20 ft wide, each set of saws being belt driven by a 35-hp, 220-volt, 3-phase induction motor rented from the central station. Tests will shortly be undertaken to determine whether a smaller size of motor can handle the work satisfactorily. The ice is floated in 12-ft by 18-ft cakes to the head of the artificial channel, where the channelmen push it under the first row of saws, which cuts seven parallel blocks 28 in wide. These segments, still in reasonably close contact, are then turned around in the channel and are pushed through the second set of saws, which cuts the cake into nine 20-in blocks.

The entire operation, resulting in the cutting of each cake into sixty-three blocks, consumes barely half-a-minute, after which the blocks are separated by long-handled ice tools and are rapidly poled to the chain and harvested into the house at the rate of about 120 blocks per minute, a day's run aggregating about 5000 tons. The present hoisting chain is steam-driven, but this year a motor-driven chain is to be used. The services of several men will also be eliminated by the installation of an accelerating toothed cylinder in the channel outside the ice house, the cylinder to be driven by a 7.5-hp motor. A 35-hp motor-driven, 10-in by 12-in pump is also to be placed in service to facilitate the removal of chips cut off the ice blocks as they pass into the house, all blocks being automatically chipped to a standard size of 12 in by 20 in by 28 in and weighing about 212 lb each.

ELECTRIC COAL MINING

Electric coal mining is a department in which several member companies are actively engaged, as noted in previous reports. Mines of all kinds are large users of energy, but it is not yet fully realized that supply from a central source is most economical and dependable; even where with waste coal on the spot it would seem that no outside source of supply could possibly compete. One recent installation must suffice as to this field.

The O'Gara coal mine in Sangamon County, Ill., has been operating with electric drive exclusively for a long period, 800 to 1000 tons of coal being produced daily at an average cost of $400 per month for electrical energy, according to data of the Springfield Light, Heat & Power Co. of Springfield, Ill. Accepting this data, the mining company is operating at approximately the cost of its former coal bill, without the attendant inconveniences in the winter from heat radiation and freezing of water, besides the additional labor required with steam.

Electrical operation of the mine has eliminated the use of mules, horses, coal, waste, packing and firemen. Water in this district is unsuitable for boiler feed, except when treated with some compound. The two major advantages of electrical drive in this instance are the elimination of heat radiation from steam pipes and doing away with mules. To care for a mule costs 75 cents a day, and the wages of the drivers are $2.83 a day.

Some coal-mining companies in Sangamon County have been reluctant about installing electric drive, but the local electric-service company agrees to install the apparatus, the payments on which are made by instalments. The electric-service company in Springfield estimates that a 1000-ton mine in Illinois can be equipped above and below ground for electric service for about $15,000. This includes the cost of installing, rebuilding, bonding rails and running trolley wires for locomotives. It is stated that the equipment will pay for itself in four years whether the mine is operating or not. Electric service shows its greatest saving over steam operation when the mine is not running. This is a considerable item where strikes are prevalent and the mine is shut down, as the gases and water have to be kept out of the mine whether it is in operation or not. There is the additional advantage of being able to increase the output of a mine without replacing apparatus or making numerous changes in pipe lines.

The rate earned is determined by the maximum demand and the energy consumption. As two voltages are used in the mine, separate printometers are employed to record the consumption of energy. From the records kept since the installation of electric drive, about 1 kw-hr of energy has been consumed per ton of coal mined.

Electrical energy is delivered to the O'Gara mine over a 6600-volt, 3-phase transmission line. The connected motor load aggregates 405 horse-power. All of the wiring is run through conduit to the various motors.

The coal mines in Illinois are fairly dry and practically devoid of dangerous gases. Faults in the structure of the earth are prevalent, however, and the shafts are lined with concrete to prevent slides. The interest on the investment for constructing such shoring and benching in the different levels counterbalances the cost of pumping in wet mines.

Two vertical shafts are installed in the O'Gara mine at present—one for delivering fresh air to the mine and the other for the removal of coal. Each shaft is provided with a 216-cu ft sump pit for collecting the small amount of water which seeps into the mine each day. Both sumps are emptied by a single automatic electric pump, which is required to be operated only about one hour each day. The apparatus used for emptying the sumps consists of a two-stage, horizontal, centrifugal pump, direct-connected to a 220-volt, 3-phase squirrel-cage motor. Operating at 1700 r p m, the pump is capable of delivering 50 gal per minute.

In this mine the coal is lifted a total distance of 300 ft. The old steam-operated cage hoist formerly used has been replaced by an electrically driven hoist. A maximum rope speed of 800 ft per minute is obtainable on this hoist, and a round trip is completed in thirty seconds. Eight seconds is required for accelerating the car to full rope speed; eleven seconds elapse with the car in uniform motion; five seconds is required in retarding the car, and six seconds is required in dumping and caging. Each car is capable of carrying 1.5 tons to 2 tons. The two cars are balanced on the opposite ends of the hoisting cable and are driven by a 150-hp motor, connected to the hoisting drum through one reduction of herringbone gears. An operator at the top of the shaft controls the hoisting motor and brakes.

The coal is lifted 30 ft above the ground and dumped into shaker screens where the different sizes of coal are sorted. These screens are 8 ft wide, 2 ft deep and from 12 ft to 25 ft long. A two-speed squirrel-cage motor operates the screens. Two speeds have been chosen in operating the shakers, as it has been found that when the quantity of coal in the shaker is considerably lower than the normal amount, the screens are shaken to pieces by the vibration.

In new mines in this district experience has shown that 20,000 cu ft of air per minute is sufficient for ventilation. As the mine grows older and more veins are opened up, the liability of stagnation increases and as high as 150,000 cu ft of air per minute is required. The ventilating fan in the O'Gara mine is geared to a 50-hp, two-speed, squirrel-cage motor. During the eight hours of the day when the men are working, the fan is operated at full speed; at other times it operates at half speed.

As the coal is mined it is loaded into cars which are pulled to the hoisting cage by an electric locomotive operated from a 270-volt trolley wire and capable of pulling an 8-ton load.

In the blacksmith shop is a 5-hp squirrel-cage motor which operates a blower furnishing a draft for the forges. This motor is run at an operating speed of 1130 r p m.

Alternating current is used for most of the motors in the mine, but the locomotive requires direct current. A 100-kw rotary converter is installed in the hoist operator's building on the surface for furnishing 250-volt to 275-volt direct current. In the same building with this rotary converter are the hoisting motor, the control apparatus and the switchboard.

Steel works again may be cited as one of the large opportunities of the central station, although they might be naturally regarded as being self-sufficient as to energy supply. One recent example as to what is being done here may suffice. Several of the independent steel companies in the coal and iron region of Pennsylvania and West Virginia, among them the Apollo (Pa.) Steel Co., Weirton (W. Va.) Steel Co., West Leechburg (Pa.) Steel Co., Blaw Steel Construction Co. of Hoboken, Pa., and the Vanadium Alloys Co. of Pittsburgh, Pa., are large users of electric drive, and draw their energy supply from the lines of the West Penn Traction Co. In the cold-rolling department of the West Leechburg Co.'s plant, electricity is extensively used for driving the rolls, machine tools, cranes and lifting magnets. The energy is brought in on lines from the Connellsville, Pa., generating station, although there is connection to the lines of the Allegheny Valley station for use in emergency. This 3-phase, 60-cycle current at 2200 volts pressure, is converted to direct current by means of a synchronous motor-generator set. The Weirton Company has recently completed the construction of a group of mill buildings, the largest of which occupies a ground area measuring 300 ft by 200 ft, in which all rolling-mill drive and auxiliary mechanical operations are done electrically. Energy for this electrification is drawn from the substation at McDonald, Pa., the tension on the incoming wires being 25,000 volts. Here the direct-current drive is preferred, and in order to obtain this from the alternating-current circuits two motor-generator sets of 1500 rated horse-power have been installed by the steel company.

SIGNS AND SLOGANS

The electric sign has placed itself more in evidence this year than ever. It would certainly seem to be "here to stay," although in some cities there have been efforts to limit, restrict, or even abolish all outdoor advertising. Thus the report of the

New York billboard commission submitted last year embodied stringent rules which would prohibit all outdoor advertising—except shop signs—in the vicinity of parks, public buildings and certain streets, and would prevent the operation of large or flashing electric signs in residential districts. Furthermore, a tax was recommended on all outdoor advertising, and it was proposed that moral and esthetic censorship be provided for regulating the character of the displays. No sensitive observer can conscientiously defend some advertising atrocities which mar the streets of American cities, but, on the other hand, most electric signs deserve immunity from this general attack, in consideration of the other benefits they confer on their communities. Chief among these, of course, is the electric sign's supplementary service in lighting the streets. There are cities in this country whose connected sign load is actually double the entire kilowatt rating of the local street-lighting system, and in the average progressive community this ratio is at least unity. Most of these sign lamps are directly effective as free public-lighting sources; this practical fact is attested by the ordinances of certain cities which permit electric signs only, absolutely prohibiting all "dead" signs. In the before-mentioned residential sections, too, which are usually poorly lighted, electric signs and lighted billboards certainly contribute to the safety of late home-comers and timid householders. Nor should esthetic legislators and their advisers overlook the business-creating values of electric displays and their direct bearing on the commercial activity and prosperity of their vicinities. The street with the bright sky-line is always the one most traveled after dark, and a city's connected sign load is invariably the index of its progressiveness. By night most of the big electric signs are spectacles of real beauty and artistic design. Esthetic criticism, if in order, might be directed at the daylight appearance of the great steel structures required by city building departments to support roof and overhanging signs. Some architectural veneer is badly needed in many instances. In this, as in other respects, the services of an intelligent regulative censorship might be of use to the public and to the electric-sign industry itself, but no one can believe that American cities will revert to the nocturnal dull conditions that prevailed in them before the electric sign came into existence. Anything that in any way punctures black darkness with light has a claim to be treated as esthetic on that ground alone.

The year has seen a number of new electric "slogans" introduced, and the city without one is almost convinced that it is a back number. Note can only be made of one or two. As a Christmas present, the Toledo (Ohio) Railways & Light Co., a Doherty property, has presented to the city of Toledo one of the largest and most elaborate municipal slogan signs ever constructed or erected. It measures 58 ft high and 78 ft long. The first picture to appear shows an engine, tender and train of cars. Presently the train is seen to start, smoke comes from the stack in short puffs, and sparks shoot from under the wheels as they revolve. As the cars gain speed, the track recedes and the smoke stretches out over the entire length of the train. Meanwhile the moving parts of the engine are working, and the whole picture gives an accurate representation of a train going at full speed. The train picture then disappears and next a huge freight steamer, of the kind used on the Great Lakes, is seen plowing through the water, throwing up spray at its bow. Its flags are waving, smoke belches from its huge stack, and waves strike against its sides. The idea in showing the boat and train is to emphasize Toledo's importance as a center of transportation by both land and water, for the city's position at the head of Lake Erie and at the point of debouchure of the Maumee River with its system of cross-state canals has given Toledo a location of great strategic value in the country's inland commerce.

Then, as the boat fades away the city's slogan, "You Will Do Better in Toledo," is flashed on in 18-ft letters, while around the legend, revolving in different directions, appears a border of vari-colored light. Three rows of lamps make up the letters—two rows being white and one red, so that the resultant is a pink color.

More than 7000 10-watt tungsten lamps were utilized in building this big sign, which complete weighs about 24 tons. It was erected on the roof of the Valentine Building, in which the Toledo city offices are located. The first exhibition of the sign was made a civil event. The Toledo Railways & Light Co. will maintain the sign, the city furnishing only the location.

Another striking and artistic electric slogan display in operation in Toledo is the "Do It Electrically" sign, which the Society for Electrical Development recently erected in a prominent rooftop position, There are over 500 tungsten lamps in this sign, and the words of the motto are surrounded with a Persian jewel border in eight colors.

At the close of the year a permit was issued by the San Diego (Cal.) building department for the erection of what will be the largest electric sign in southern California. The display contains 32,000 lamps and is 48 ft high. Its cost is $10,000. Across the top in large letters appears the slogan: "San Diego, First Port of Call," while the lower half of the sign is devoted to flashing electric displays of business firms. Energy to light the sign is furnished by the San Diego Consolidated Gas & Electric Co.

The White River hydro-electric station of the Puget Sound Traction, Light & Power Co. is situated at Dieringer, Wash., 28 miles from Seattle and 13 miles from Tacoma, in plain view of passing transcontinental trains of the Northern Pacific, Great Northern, Chicago, Milwaukee & St. Paul, Union Pacific, Southern Pacific and Burlington routes, as well as of the Seattle-Tacoma interurban trains. In the belief that considerable advertising value would be derived from an electric sign on this station, suggestions for such a display were requested from employees of the company, and of the many designs submitted the one by Mr. W. N. Gordanier, superintendent of the company's Electron power plant, was selected. As first proposed, the names of the cities shown—Bellingham, Everett, Seattle and Tacoma—were placed in geographical order from south to north, but later Mr. A. W. Leonard, general manager of the company, suggested rearranging them in the reverse order from north to south, so that the initials of the names would spell the word "Best" when all the other letters in the names were turned out, thus leaving the sign to read "Reliable Power"—"Best Light Service." The letters in these words are in red, and the remaining letters in each name come on by cities until the names are spelled out in full. The waterfall, framing the top of the huge sign, as well as the boiling effect of the water at the bottom of the falls, is both realistic and beautiful.

The sign is 200 ft long and 54 ft high. It contains 4000 30-watt carbon lamps arranged in ninety-six letters, the largest of which is 8 ft high. The sign has a total connected load of 120 kw, and its steel work alone weighs 18 tons.

An electric sign asserted to be the largest single-word electric roof display in the world, has been put in operation on the Majestic Building, Milwaukee, where it advertises Gimbel Brothers' department store. The sign formerly in this position was destroyed by a severe storm, and to guard against a similar accident twenty concrete piers measuring 2 ft by 2 ft have been laid in the roof as sleepers for the 8-in by 14-in double angle irons used as the vertical and horizontal supports. The sign is lighted by 1500 10-watt tungsten lamps supplied from the circuits of the Commonwealth Power Co. The letters are 32 ft high, and the entire sign measures 159 ft long and 52 ft high. The size of the individual letters makes it possible for the sign to be read at a distance of 15 miles on a clear night.

An electric bulletin about 28 ft high and 26 ft wide, mounted on the wall of the Filene-Ditson Building, in the heart of the business district of Boston, Mass., was the most conspicuous feature of a recent successful ten-day money-raising campaign for a new hospital. The display included a "thermometer" 28 ft long with a mercury column formed of red ribbon 6 in wide. As subscriptions increased, the advance of the campaign was recorded on this "instrument." The display was illuminated by six 100-watt tungsten lamps screwed into bases in metal reflectors 18 in square and 10 in deep, the reflectors being hung from 10-ft brackets about 6 ft away from the wall. The reflectors were painted white on their inside surfaces, and service was maintained from dusk until midnight throughout the campaign. Energy was supplied by the Boston Edison Company.

ELECTRICITY ON THE FARM

It would be interesting and useful to secure data as to the number of farms and homes in rural districts that are being "hooked up" every year on central-station and power transmission circuits. In the meantime there are many evidences on every hand that the process is going on, and note may be made of a few of them, leading off with the more theoretical and experimental part of the subject.

At Moraine Farm in the fertile valley of the Miami River, about four miles south of Dayton, Ohio, experiments reported by Dr. Herbert G. Dorsey have been carried on during the last year to discover the effect of electricity and artificial illumination on the growth of vegetation. The experiments have been fostered by the direct efforts of Mr. F. M. Tait, past-president of this Association. In the preliminary tests a number of small plots were marked off for exposure to different kinds of electrification, the idea being to carry out later, on a larger scale, those methods which offered the greatest promise. In order that the soil should be uniform in the test plots, the top earth was first collected, thoroughly mixed and sifted, and then laid to a uniform depth of about 7 in over the entire test area.

Plot No. 1 was excited by high-frequency currents. A transformer stepped the 110-volt, 60-cycle alternating current up to 5000 volts, charging a condenser of tinfoil and glass plates which discharged through the primary of the coil and a spark-gap. A network of No. 30 B & S gage wire stretched about 12 in above the plot was connected to one terminal of the Tesla coil, the other terminal being led to a wire screen which was buried in the earth. The transformer and coil took about 130 watts and were operated one hour morning and evening. The potential difference between the soil and overhead wires was about 10,000 volts and the frequency perhaps 200,000 cycles per second.

Plot No. 2 was illuminated by a 100-watt tungsten lamp with ruby bulb three hours daily, beginning at sundown. Plot No. 3 was illuminated by a mercury-vapor lamp three hours per day, beginning at sundown. Plot No. 4 received no artificial stimulation, but was used as a "control," so that comparisons might be made between the plots receiving excitation and one receiving none.

In Plot No. 5 was buried a wire network connected to the negative terminal of a 110-volt direct-current circuit. The latter's positive terminal was led to a small sprinkling can having a carbon electrode in the middle insulated from the can itself, which could be connected to the negative side. The can being filled, the water was first subjected to electrolysis for about three minutes. During this time the temperature of the water would rise from about 70 deg. fahr. to 90 deg. fahr., becoming filled with gas by the evolution of oxygen and hydrogen. While still bubbling, the negative terminal to the can was opened and the plot sprinkled, the idea being that current might flow from the can through the streams of water to the soil.

Plots Nos. 6 and 7 were subdivided into four individual boxes, 2 ft square, each separated by procelain insulators and arranged with carbon electrodes at opposite ends. To those electrodes were applied both alternating and direct current taken from commercial-lighting sources and from dry cells. Some of the boxes were excited only after germination. The currents flowing were found to vary from 0.0003 amp to 0.0700 amp, depending on the moisture present. All such current-flow results were, however, uniformly negative, germination being retarded and growth stunted.

The plots tested were planted with radish and lettuce seed, samples of which had previously been tested for germination. No stimulation was attempted on Plots Nos. 1 to 5 until after germination. The seeds were planted January 16th, and on January 29th stimulation was begun on Plots 1, 2, 3 and 5. About three weeks later ten plants each of radishes and lettuce were selected at random from the five plots and weighed as shown in the accompanying table.

RESULTS OF TESTS IN ELECTRIC STIMULATION OF VEGETABLES

Radishes (ten plants selected at random):	Plot 1 Tesla	Plot 2 Ruby Light	Plot 3 Mercury Vapor	Plot 4 Control	Plot 5 Electric Sprinkling
Total plant weight, grams ..	265.70	137.80	109.50	180.00	78.50
Edible portion, grams	139.50	57.40	40.90	79.40	31.00
Edible portion, per cent	51.15	41.65	37.34	44.11	39.49
Tops and leaves, grams	120.50	75.70	65.90	95.00	41.50
Tops and leaves, per cent ...	45.35	54.92	60.18	52.77	55.66
Roots, grams	9.30	4.70	3.20	5.60	6.00
Roots, per cent	3.50	3.43	2.48	3.12	4.85
Lettuce (ten plants selected at random):					
Total plant weight, grams ..	67.00	52.60	56.50	46.10	31.30
Edible portion, grams	60.70	47.30	50.20	41.80	28.20
Edible portion, per cent	90.59	89.92	88.85	90.67	92.10
Roots, grams	6.30	5.30	6.30	4.30	3.10
Roots, per cent	9.41	10.08	11.15	9.33	7.99

From this table it will be seen that the plot subjected to the high-frequency current showed a greater increase in yield than any of the others. Ruby light ranged second for radishes, while violet light was second for lettuce. The electric-sprinkling system apparently proved worse than no stimulation at all. Comparing the high-frequency plot with the control plot, the edible portion of the lettuce grown is 75 per cent greater than under natural conditions. An attempt was next made to repeat the experiments, using tomatoes and cucumbers, but the investigators were prevented from getting any results because of interruption by the Dayton flood.

The results obtained from the high-frequency tests seemed, however, sufficiently encouraging to warrant starting work on a larger scale. A 2-acre plot of good soil in a flat field was accordingly selected to be used as a house garden, and was arranged to be sprinkled by an overhead system of pipes supported from a catenary suspension system 14 ft above the ground. The pipes ran east and west a distance of 200 ft and were spaced at 50-ft intervals north and south for a distance of 400 ft. In the northeast corner of this garden seven wires of No. 12 B & S hard-drawn copper were stretched north and south 200 ft, the wires being 9 ft above ground and 15 ft apart. The ends of the wires were attached to insulators on top of 4-in gas pipes set in concrete, and at the middle they were supported by suspension insulators from one of the sprinkling pipes. The insulators used had been built for 60,000-volt work. The wires were elevated sufficiently for the soil to be plowed with horses. It should be noted that the high-frequency system was independent of the sprinkling system. Occasionally the two were run at the same time.

At the eastern edge of this plot was built a small transformer house in which a 7.5 kv-a transformer stepped up 220-volt, 60-cycle energy to 11,0000 volts. A choke-coil was placed in series with the primary. The secondary was connected to a spark-gap and shunted across this was the condenser in series with the primary of the Tesla coil. The primary of the Tesla coil was made of eight turns of No. 0000 wire and the secondary consisted of seventy-five turns of No. 14 B & S gage on a wooden drum 15 in in diameter and 18 in high. Both primary and secondary were immersed in a 50-gal stoneware jar filled with transformer oil. The lower end of the secondary was connected to the pipes of the sprinkling system which furnished a ground connection, and the upper end was led out through a 60,000-volt bushing to the middle of the antennas. The spark-gap was formed of two rectangular boxes of thick copper with two faces parallel but separated by 0.25 in. The boxes were hollow and filled with water and gave excellent service as a stationary spark-gap.

Considerable difficulty was experienced in getting the system to work properly. Condenser plates were continually breaking down until the condenser was built of old photographic plates

8 in by 10 in, using two glass plates and then a sheet of tinfoil. Two boxes containing about 300 glass plates, each filled with transformer oil, gave a good condenser of about 0.1 mf capacity. Such a condenser did not break down, and it was not even necessary to remove the coating from the plates.

It was the latter part of July before the system could be considered in perfect working order. At that time a pressure of 50,000 volts was being given as measured by the needle spark-gap between the antennas and earth. The garden was then electrified daily from 6:30 to 9:30 A M and from 1:30 to 3:30 P M.

The frequency of the oscillatory currents was estimated to be about 30,000 cycles per second, and at 50,000 volts sufficient energy was radiated from the lines to give to birds attempting to light on the wires a shock that felled them to the ground partially stunned. None, however, was actually killed. The total energy consumed from June to Sept. 1 was 221 kw-hr. Of this amount probably half was wasted in the inefficient choke-coil.

Because of the delay in getting the system in good working order, only qualitative rather than quantitative data are available. However, it is very apparent that almost all the vegetables grown under the wires are better than those not electrified. The plants stimulated included radishes, lettuce, beets, cabbage, cucumbers, turnips, muskmelons, watermelons, tomatoes and parsnips. Little or no difference could be observed in beans and peas. The gardner in charge however, picked almost all the others at least two weeks earlier under the wires than in the unelectrified portions.

All these different vegetables were planted in rows running east and west, so that one-half of the row was electrified while the other half was not. Actual weights were obtained only in the case of tobacco. One end of a row was cut under the wires and the plants averaged 1687 grams each. One week later the other end of the row was cut and the plants averaged 1632 grams per plant, so that electrification may be credited with a gain of 55 grams per plant, or an increase of 3.35 per cent. But since the most rapid growth of tobacco occurs during the last two weeks, it is estimated that the increase in weight had both ends of the row been cut at the same time would have been about 20 per cent.

No satisfactory theory is at present offered to explain the increased yield due to high-frequency electrification. It is felt that insufficient data are yet at hand to form any theory or to determine whether such experiments will be successful from the financial standpoint or not. The expenditure was much greater than the increased yield gained. Several questions arise which it is hoped will be answered some time during the next year, among them: Is the effect due to the potential gradient between the wires and earth, or simply to the total potential difference? Does the effect depend on the frequency of the current, and, if so, what is the best frequency? What is the best amount of stimulation? If any of these problems can be solved during the present winter in the greenhouse, the results will be utilized in the larger experiments during the summer.

One dollar per month for each cow milked is the saving which the dairyman can accomplish by the use of an electric milking machine, according to Mr. James E. Davidson, vice-president and general manager of the Pacific Power & Light Co., Portland, Ore., who presented a paper on electrified farming before the Seattle convention of the Northwest Electric Light & Power Association, N. E. L. A. Section. Roughly, one man with a four-unit milking machine can milk four times as many cows as he can by hand in the same length of time. Incidentally, the central station obtains a load that is guaranteed for every day in the year with an early morning load that is of special benefit. Every cow milked by the machine earns for the company $1.75 per year, figuring that one four-unit machine will handle a herd of twenty-eight cows. "Eight times out of ten," said Mr. Davidson, "the salesman who is trying to sell an electric milking machine will accomplish his result if he directs attention to the fact that with electric milking 75 per cent of the cost of milking is given back to the dairyman in net profits; that the output of milk is cleaner and better because of the decreased number of bacteria, and that the use of the machine dissipates the nightmare of always trying to find a reliable, cleanly, gentle and efficient man who will stay right on the job twice a day, 365 days in the year, who has a disposition so patient that he will gently milk a cow while she slaps her tail around his neck and places her foot in the bucket, or who will coolly sit down beside a hot cow and milk her in fly-time with the thermometer 100 deg. in the shade!"

Year by year the state fairs are becoming more and more important to electrical manufacturers as media for introducing electrical appliances among farmers. The increase over last year in the number of companies which exhibited small gasoline-engine-driven electric-generating plants during the Wisconsin State Fair at Milwaukee shows, for example, that these companies have realized the opportunity afforded for exhibiting their products to a class of citizens heretofore reached in only a casual way. On the other hand, the eagerness with which the rural visitors viewed the newly developed electric-lighting plants and motor-driven farm appliances should prove the receptive attitude of the farmer as a user of electricity. Of the four thoroughfares which extend the length of the fair grounds at Milwaukee, two were devoted almost entirely to mechanical apparatus of this character. The lesson for central station and power transmission companies is certainly impressive. The North Dakota Federation of Women's Clubs believes that the women on the farm are entitled to the same advantages as are possessed by the women of the city. By the introduction of labor-saving devices, such as electric flat-irons, electric washing machines, electric cream separators and the like, it feels that a decided step has been taken toward making farm life more attractive to the farmer's wife and daughter. The ladies do not appear to be quite sure where the electricity is coming from, but at any rate they are interested in the subject, as shown by the fact that a rural betterment department has been established by the federation to familiarize farmers' wives with these modern improvements.

The new hundred-and-fifty-thousand-dollar mansion which Mr. James J. Hill is having constructed on his 7000-acre farm at North Oaks, near White Bear, Minn., is to be equipped to utilize electricity to the fullest extent. Electric motors will be used for various farming operations, the total connected load amounting to about 65 hp. Energy will be supplied to the North Oaks estate by the Stillwater division of the Consumers' Power Co., a Byllesby property. Prior to signing a five-year contract with the Consumers' Power Co., Mr. Hill had experts investigate the advisability of an isolated power plant, but eventually he decided in favor of central-station service. Many inquiries have been received by the Stillwater division from farmers desirous of using electrical energy for both lighting and motor purposes, with an undoubted result in much new business.

With the completion of 15 miles of 33,000-volt line and of 10 miles of 2300-volt circuits centering about the town of Blue Grass, Ia., and reaching Wolcott, Stockton and Durant, the People's Light Co. of Davenport, Ia., has begun a campaign for securing rural customers. Along the 2300-volt line from Wolcott to Blue Grass and to Stockton, twenty-two farmers have already been connected. A 33,000-volt outdoor substation has been erected at Wolcott, and from this equipment are fed the 2300-volt circuits leading south and west from the city. Customers' motors are connected to 220-volt taps from the transformers, and lighting circuits are operated at 110 volts. All lines and transformers for the rural customers have been furnished by the electric-service company, the customers in return guaranteeing a four-dollar minimum monthly bill. When a farmer living at such a distance from the company's lines that an extension would not be justified, desires service, the company offers to erect a line to his property at a cost of $7 a pole. The charge for energy for service in this case is the same as that to other rural patrons. Meter reading is taken care of by a local garage man in Wolcott who charges the company only for the actual time he is engaged in his monthly rounds. Forming a co-operative association, the farmers along the lines have determined to do their 1914 threshing electrically. A 20-hp motor is to be purchased by the association and mounted with its control equipments on a wagon so that it may be taken from one farm to another as the work of the "threshing ring" progresses.

On the Battle Creek Estate, not far from Muncie, Ind., motor drive has been applied to all farm machinery where savings seemed possible. Some of the motors perform work at which they have proved particularly advantageous. For example, a 15-hp motor has been belted to an ensilage cutting and blowing machine, which cuts the green fodder into shreds and elevates it to the top of the 30-ft silo. The induction motor, auto-starter and fuse blocks are mounted on a movable platform, so that when the services of the apparatus are required at different places on the farm a team may be hitched to the skids and the motor and starting apparatus transferred intact to the new location. Arrangements have been made for establishing service connections at several convenient points about the barn and surrounding buildings.

Although at present no cost data are available on this particular installation, tests made on a similar silo show that a steam engine and an engineer could be hired to cut the fodder and elevate it into the container at a cost of $45 for a full charge. The same silo was filled the following year by means of a 15-hp electric motor operated by the farmer alone, at a total cost for energy of $16. It is estimated that with the equipment described above ensilage can be cut at the rate of 13 tons an hour. The motors on this farm are all operated from the circuits of the Muncie Electric Light Co. Sixty-cycle energy is delivered to the farm over a short 3-phase transmission line at 2200 volts and is transformed to 220 volts for motor service and 110 volts for lighting.

The Noblesville Heat, Light & Power Co., operating an 825-kw station at Noblesville, Ind., twenty-five miles north of Indianapolis, is one of the smaller companies which has been making strenuous efforts during the past year to secure rural customers for its circuits. The success which has attended these efforts has been marked. One hundred strictly farm customers have been added to the company's list of patrons, in addition to a number of suburban homes not formerly reached, and several neighboring small towns which have been supplied with electrical energy over the rural transmission lines.

The city of Noblesville had in 1910 a population of 5073, while the surrounding towns which are supplied with energy from the local station are led by Lapel with 1045 inhabitants, Cicero and Arcadia having each 990 people, Westfield having 770 and Fishers 188. In Lapel, Arcadia and Westfield electrical energy is also furnished from the Noblesville plant for street lighting. A local distributing company at Cicero buys the energy at wholesale from the Noblesville station and retails it to the inhabitants and to the city for street lighting.

All of the farm lines except that running six miles north from Lapel are operated at 2200 volts. The Lapel line carries 4400 volts. All service is single-phase. For the strictly farmer-service circuits the company estimates that at least four customers per mile must be obtained to make the line commercially profitable, and the following clauses are quoted from the contract form under which these lines will be built:

"Application is hereby made to the Noblesville, Heat, Light & Power Co., by the undersigned for electric service for light and power on a line extending into the county and along the public highways in Hamilton and adjoining counties in Indiana, for a period of three years from date.

"The rate for service to be the same as prevails to customers in the towns, viz, 10 cents per kilowatt-hour, subject to a discount of 5 per cent if paid on or before the fifth of the following month.

"The undersigned applicant agrees to use enough energy to make a quarterly bill of $1.50, or to pay that amount should sufficient energy not be used.

"The undersigned applicant further agrees to equip his premises to use electricity for such purposes as he may desire and pay for same, together with a transformer and wires from the main line of poles to his premises.

"The undersigned applicant further agrees to pay his proportional share of the cost of the main line in the public highway along his premises, with at least three other applicants per mile, provided the line does not exceed $200 per mile and with the understanding that the money thus paid for main line in public highway is to be refunded to said applicant in energy used at the above-mentioned rates.

"It is understood that the main line is to be owned, controlled and maintained by the Noblesville Heat, Light & Power Co., its successors or assigns.

"A written acceptance of this application by the Noblesville Heat, Light & Power Co., shall make this a contract between the parties."

All lines built under this contract have been erected with standard two-pin arms on 25-ft poles spaced at distances varying from 150 ft to 225 ft, depending upon the kind of wire which was being strung. Where the load is light the 225-ft spacing has been used to advantage, employing copper-clad steel wire for the conductor. Higher poles are used at road crossings and other places where the clearance demanded is more than can be given with a 25-ft pole.

Mr. John T. Kestner, who is contract agent of the Noblesville station and who has taken considerable personal interest in building up the farm load, says that the central Indiana farmer is not as keen as he might be concerning the possibilities of motor service, and that educational campaigns along this line are needed to stir up proper enthusiasm. However, the subject of electrically lighting the barn, when properly presented to the man who has always had to depend upon a smoking kerosene lantern for illuminating about 128,000 cu ft of space, which is a fair figure for an average barn, never fails to be a talking point, capable of holding attention and of creating that interest which speedily leads to the signing of a consumer's application.

The work of electrical irrigation always open up immense possibilities and furnishes also remarkable figures as to connected load and current consumption. In the delta of the Sacramento and San Joaquin Rivers of California, for example, are lands reclaimed from valueless swamp, comprising some 750,000 acres. This land, reminding one of the great stretches in Holland or on the eastern coast of England by being protected by strong levees, is now equipped with great motor-operated pumps, and is of unsurpassed fertility, attractive for all purposes of ranching, dairying and truck farming of every kind. In this territory the Great Western Power Company has extended its 22,000-volt feeders and not long since was supplying energy for irrigation and general agricultural purposes to the tune of 4644-hp connected load. This may be regarded as typical. To take another instance, in the *Electrical World* of February 14, 1914, Mr. A. J. Rosborough, general manager of the California-Oregon Power Co., San Francisco, Cal., gave an interesting account of the application of electric pumping to the irrigation problems of the neighboring country, as follows: "One great factor in the development of electricity on the Pacific Coast is its use for electric pumping and other farm service. During the year 1913 two projects were started in northern California for the subdivision of large tracts of land, formerly used for stock grazing, into farms of from 40 acres to 140 acres each. The company undertaking these projects set about them in a very businesslike manner. First the land was plowed and sown to alfalfa; then two large electrically driven pumps were installed, one of sufficient size and capacity to lift the water 85 ft into a main ditch, which with laterals fed an area of over 3000 acres, the other pump being employed to lift water another 65 ft, supplying irrigation to an additional 1500 acres. After this the company purchased blooded hogs and began breeding them, and the farms were opened to settlement. The settler had his choice of location and the company fenced in the section, built a house and barn, wiring both for electricity, delivered the required number of hogs, and took a small initial payment, selling the land at a moderate price. The farmer was thus put on a paying basis at the start and furnished with a possible source of steady income. This year the same company intends to put 8000 acres under irrigation and to sell it in a similar manner. In one of the adjoining valleys 20,000 acres are being cleared and subdivided and will be sold on a like plan, and there are other projects of this nature under way." The California-Oregon Power Co. supplies the energy for much of this summer pumping, and, according to Mr. Rosborough, it plans to build up a corresponding load for the winter months, consisting of electrical heating and the operation of agricultural machinery.

Note must here be made of the largest known motor-driven irrigation plant in the world. For some years the transmission systems in the arid portions of the West, known as the "Great American Desert," have been taking on here and there a load of motor pumping for irrigation purposes. This turns to a garden if supplied with water, and while irrigation companies and the government have done enormous work for betterment there are sections in which natural flow is difficult to find. In these cases, with cheap electrical energy, water can be pumped from the rivers at a low enough cost to make it economical for irrigation purposes, and the transmission companies obtain a very welcome type of load. In the first place, when in use at all, pumping is a wonderfully steady load, and, in the second place, the induction motors almost universally used for pumping are very desirable on a big transmission system with much distributed capacity. By far the biggest single enterprise of this sort is that in the Snake River Valley. The two pumping stations already installed have a combined rating of about 200,000,000 gal for twenty-four hours when driven at full load. The lift varies from 80 ft to 177 ft. and four canals are fed from this supply, covering an aggregate of about 18,000 acres. Centrifugal pumps are used, driven by induction motors which are fed from the 40,000-

volt transmission system of the Idaho Railway, Light & Power Co. The pumps show an efficiency slightly above 80 per cent. The pumps feed the canal through wood-stave conduits, portions of which operate under as great a pressure as 75 lb per square inch. From the standpoint of the farmer such irrigation can be made economical, and the load can be so regulated as to give the transmission companies a heavy demand at times when the load would otherwise be light.

MISCELLANEOUS APPLICATIONS OF ELECTRICITY

The headline above is rather suggestive of an attempt to particularize the contents of a modern city directory, so infinite are the names, classes and groups. It seems to have been fairly easy for Noah to get all the animals of his time lined up, but that must certainly have been in the days before homogeneity broke loose into heterogeneity. Human advance will have nothing to do with the rigid classification that all modern legislation is trying to stamp on it in one way or another, and electrical advance, a practically synonymous term, is equally rebellious under limitation and restraint. "No pent up Utica confines our powers." The other part of this need not be quoted, because the application is so obvious. Just a few of the other incidental applications not already touched upon may here be noted, illustrative but in no way comprehensive. The attempt made is merely to "hit the high spots."

The use of the ultra-violet radiation from quartz-tube mercury-vapor lamps in the sterilization of water seems to have passed beyond the experimental stage into a very practical form of effective sterilization. The quartz-tube lamp is by no means the most convenient powerful source of such radiation because the proportion of energy in the region of very short wave-lengths is exceptionally large. One-half of the energy is completely cut off by the ordinary inclosing globe of such a lamp, but when the bare tube is brought close to the water to be sterilized the rays can get freely through the quartz and penetrate filtered water. For sterilization purposes, the ordinary commercial quartz-tube mercury-vapor lamp is not sufficiently powerful to be conveniently worked on a large scale, and hence a special type of lamp has been developed to operate on a 500-volt circuit with about 375 volts effective at the electrodes. This lamp is operated intensively at a high temperature and gives very much greater efficiency of production of the useful rays than does the lamp ordinarily used for illuminating purposes. Preliminary filtering to remove suspended matter of every kind is necessary for the effective working of the apparatus. Although the ultra-violet rays penetrate filtered water with great readiness they are stopped very effectively by matter carried in suspension, much more readily than are ordinary light rays. Whether the effect is due to the extremely small size of many of the suspended particles which scatter the ultra-violet light, or whether it is chiefly due to organic or inorganic matter in suspension is not yet clear, but the operation of an ordinary filter permits the necessary penetration of the ultra-violet rays to secure rapid sterilization. The value of the process is its cleanliness, leaving the water entirely suitable for use. Various chemical agents used for water purification are, perhaps, equally effective in killing bacteria, but are not quite pleasant to have in drinking water. A plant in which from 7500 to 8000 tons of water per day is sterilized is a direct example of the practical application of the process.

There are other ways of achieving the same result. An electric water sterilizer which has recently been patented is composed of three principal parts—an electrode box, a coagulation chamber and two filter cylinders. The electrode box consists of a series of pure-iron plates, separated by marginal insulating gaskets. Through each of these plates, inside of the gaskets, and at alternating ends of the successive plates, is a series of holes. The water is passed successively between the several plates and over the entire plate surface. Electrical connections are so arranged that this entire series of water films is in the circuit at the same time, the voltage between plates being regulated by the number of plates in a series. The current consumed for a plate 10 in by 10 in square with city water, treated at a rate of about 400 gal an hour, is only 0.5 amp at 110 volts.

After leaving the electrode box the water passes into the coagulation chamber, where the heavier filth and dirt settles to the bottom, thus preventing the too frequent filling up of the filter beds. From the coagulation chamber the water passes through the upper part of a four-way valve to the first filter cylinder, down through the filter bed, up through a 3-way valve, into the lower section of a 4-way valve, and from there flows into the second filter cylinder. The effluent from the second filter bed flows up to a contact valve, which opens, allowing the water to pass, at the same time making an electrical contact directly from the switch on the wall to the electrode box.

The filter cylinder is arranged so that the flocculent coagulant can pass in on top of the filter bed without being broken up by a strainer of any sort used to retain the quartz when flushing. The upper outlet is above a strainer and when the machine is being flushed the inlet check closes and the water flushing the machine passes upward through a gauze strainer, which is supported between the inlet and outlet pipes in the head cylinder. This direct-current sterilizing machine, it is claimed, will remove the color from the water, destroying and removing all vegetable matter and pathogenic germs, and will leave the water bright, pure and sparkling. The machine is reversed in polarity every day. This reversal cleans the plates automatically and the debris can be flushed into the sewer.

Electric thawing of water pipes has in such winters as the past one been an incidental but quite appreciable load and source of income for central-station companies. The methods may be divided into two classes—one, most used, in which the heat to melt the ice is generated by passing a large current through the pipe, and the second in which an electrode is immersed in the fluid contained in the pipe, heating being generated as in a water rheostat, by electrolyzing the water near the ice plug. The first method requires large currents and considerable equipment but gives quick results, while the latter avoids the need of special apparatus and can be accomplished in a few hours by a single operator. Energy for thawing pipes may be obtained in several ways, among them being: By using one or more transformer units to step energy at distribution pressure down to 50 volts or 100 volts; by using energy direct from low-voltage alternating-current or direct-current service wires, or by employing a portable gasoline-engine-driven generator. Where transformers are used, 10-kw or 15-kw outfits are usually large enough.

The cost and trouble of collecting and assembling apparatus for thawing only one or two cases of frozen pipes may sometimes be prohibitive. Under such conditions it is found simpler to attach one wire (the grounded side), which should have been previously filled with a salt solution of water, then threading into the pipe a second weather-proof insulated wire having several narrow rings of insulation removed near the end to allow electrolysis of the solution. The heat generated is concentrated near the ice plug, and as the latter melts the wire can be pushed further into the pipe. From 3 ft to 4 ft of ice per hour can be thawed in this way with a current of 20 amp. This scheme may be modified by inserting in the pipe an electrically heated cartridge unit.

One thawing outfit of an unusual kind has employed a 16-to-1 series transformer with its secondary connected in series with a bank of eight 80-watt lamps fed from a 110-volt circuit. The primary winding has large cross-section and is consequently suited to deliver large currents to pipe-thawing circuits.

Time and Energy Required to Thaw Water Pipes

Pipe Size, In	Length	Amperes	Voltage	Time Required, Minutes	Kw-hr	Method
1.00	100 ft	150	60	20	....	Pipe resistance
...	16 ft	...	...	...	10	Water rheostat
0.75	.....	100	...	8	42	Pipe resistance
6.00	1 blk	...	100	60	75	Pipe resistance
0.75	.....	127.5	110	13	....	Pipe resistance
0.75	16 ft	20	...	270	1.75	Water rheostat
1.00	100 ft	150	60	25	....	Pipe resistance
0.50	125 ft	125	100	10	120	Pipe resistance
0.50	60 ft	140	130	20	6.1	Pipe resistance
0.50	125 ft	120	120	30	7.2	Pipe resistance
0.50	120 ft	120	130	15	3.9	Pipe resistance
0.50	100 ft	110	120	40	6.6	Pipe resistance
1.25	75 ft	175	115	30	10.1	Pipe resistance
2.00	100 ft	150	130	30	9.8	Pipe resistance
2.00 0.50	30 ft 50 ft	60	130	30	3.9	Pipe resistance
2.00	30 ft	110	...	..	59.4	Pipe resistance

In the accompanying table are shown results obtained with electric thawing apparatus. In one case, where 2000 services were thawed, the energy used per service varied from 2 kw-hr to 4 kw-hr. Another company offered a flat rate of $6, $8 and $10 for thawing 0.5-in, 0.75-in and 1-in pipe services respectively, and made a time and energy charge on pipes of 1.25-in diameter or over. Several central-station companies have made a charge of from $10 to $13 per pipe thawed.

The hotel with its large requirements of steam, hot water and miscellaneous uses of heat in some form or another has quite generally been regarded as a difficult proposition. But probably no other type of customer offers the central station so large a revenue from the sale of energy or affords so advantageous a subject for advertising central-station service as the hotel, according to Mr. C. A. Collier, of the Georgia Railway & Power Co., Atlanta, Ga., in a paper presented before the N. E. L. A. Southeastern convention at Macon, Ga. To other prospective customers the fact that the hotel—usually the newest and largest building in the community, requiring the most reliable service at an economical figure—has decided upon the purchase of electric service, instead of manufacturing it, may carry more weight than an all-day selling talk.

Again, looking at the hotel only as a consumer of energy, it is found that very few types of commercial business (some industrial plants excepted) consume as much energy per kilowatt connected as does the modern hotel. For instance, the combined average load-factor of two of the hotels was approximately 20 per cent, whereas the load-factors of other types of business were only as follows: Office buildings, 7 to 15 per cent; department stores, 8 to 10 per cent; newspaper publishers, 8 to 14 per cent. In other words, the ability of a hotel to use energy is almost double that of any other large commercial consumer. Another factor to be considered in connection with this comparison is the relatively small peak of the hotel load, and the absence, in comparison with other types of business, of the large "valleys," representing the hours of the day when little or no energy is used. In fact, the hotel, during every hour of the day, is a considerable user of electricity. Especially is this true if the house employs a machine for refrigeration and ice making. which is largely operated during the night hours. The fluctuation due to the change in seasons is also less than for almost any other type of business.

There is nothing more important than reliable service in order to obtain and hold the hotel as a customer. To supply such service from an isolated plant means the installation of at least duplicate, and quite often triplicate, generating units at a very high initial cost. Such a plant must be kept in prime condition and guarded from shut-downs due to labor troubles and non-delivery of coal.

In Table I herewith are given detailed data for four typical houses, representing as many characteristic types of hotel service. Hotel "A" is a modern large building, completely equipped with motors throughout, but having no ice machine. Hotel "B" has the same general characteristics as "A," with the addition of a 10-ton ice machine. Hotel "C" is a small hostelry, with no motors other than one elevator. Hotel "D" is equipped with individual-motor drive and is the most modern of the group.

TABLE I—ELECTRICAL AND STEAM-HEATING DATA FOR FOUR HOTELS

	A	B	C	D
Lighting load in 50-watt equivalents	3,200	2,600	454	1,250
Connected motor load in hp	150	128	20	160
Heating load, sq ft of radiation	16,000	1,200	3,963	12,000
Annual lighting consumption, kw-hr	307,000	334,000	19,288	118,500
Annual motor consumption, kw-hr	153,000	177,000	3,056	183,000
Building heating, lb steam annually	6,400,000	4,800,000	1,565,000	4,880,000
Kw-hr per 50-watt lighting equivalent per year	96	128	43	95
Kw-hr per hp per year	1,020	1,383	152	1,045
Lb condensation per sq ft radiation per season	400	....	398	400
Load-factor of lighting, per cent	22	29	9	21
Load-factor of motors, per cent	16	21	2.5	17

TABLE II—ENERGY CONSUMPTION FOR THREE HOTELS

	Maximum Kw-hr	Minimum Kw-hr	Ratio of Maximum to Minimum per cent
Hotel A	45,000	27,700	60.5
Hotel B	51,300	36,200	71.0
Hotel C	2,840	1,240	43.0

For the sake of comparison, the minimum and maximum monthly consumptions for Hotels "A," "B" and "C" are also tabulated in Table II. Here is shown conclusively the advantage to the central station of the ice machine in increasing the commercial load.

The greatest talking point of the advocate of the isolated plant is the claim that if engines are installed, the steam heating will cost nothing. There is probably no greater error generally made, nor one which, for the lack of specific information, goes so often unquestioned. As a matter of fact, not over 30 per cent of the steam necessary for building heating in the vicinity of Atlanta is available as exhaust steam, and of the available 100 per cent of exhaust steam not over 30 per cent can actually be used for heating during the heating season. For example, Hotel A has installed 16,000 sq ft of radiation. This radiation condenses during the heating season approximately 5,600,000 lb of steam, of which over 60 per cent is condensed during the months of January and February, leaving only 2,240,000 lb of steam to be condensed in November, December, March and April.

The kilowatt-hour consumption during the four months November, December, March and April was 169,000. Taking the N. E. L. A. figure, 60 lb of steam per kilowatt-hour, the exhaust steam available during the above-mentioned four months is 10,140,000 lb, or practically five times the steam-heating demand. Despite even this large excess, actual running tests show that the steam-heating demand in the early morning hours is so great that it exceeds the output of exhaust steam available, resulting in live steam having to be supplied to the heating system.

In connection with the using of exhaust steam for heating, it must be remembered that there are few systems that show no back pressure. This back pressure directly affects the operation and economy of the engine, owing to the fact that not only is the horse-power of the engine reduced but the steam consumption per kilowatt-hour output due to cylinder condensation is greatly increased. Therefore, the net results show very little gain in the direction of economy. In fact, Hotel A could be heated from low-pressure boilers at a total over-all cost of $2,500 per annum. This $2,500 per annum would be reduced to a maximum of only 30 per cent of $2,500 or $750, by the use of exhaust steam from the engines. This $750 is offset several times by the saving in the purchase of energy from the central station.

The point also arises as to the supply of steam for hot water, cooking, etc. In Hotels A, B and D this is handled by boilers of approximately 50 h-p, two in each hotel, the only labor required being negro firemen at wages somewhat lower than if an isolated plant were operated. Except in the morning and at mealtimes there is no heavy demand for heating and cooking so that the necessity of close attention or heavy firing is avoided.

Assuming that individual plants of the proper size, type, etc, were installed to supply these hotel buildings, and crediting each plant with one engineer and two firemen, and the additional coal, etc, directly chargeable to steam heating, the cost of manufacture per unit of energy would be very close to 4 cents per kilowatt-hour, including all charges. The remaining credit for exhaust steam for heating being very small, it would hardly affect the cost per kilowatt-hour at all.

The Duquesne Light Co., Pittsburgh, Pa., at the end of 1913 had connected to its circuits some 2800 customers receiving service through excess indicators on flat-rate contracts. Of these customers 60 per cent are commercial and 40 per cent are residential patrons who have been secured during two and one-half years of constant co-operative soliciting by the central-station company and the manufacturer of the indicators. The methods used in securing this business may be outlined as follows: Solicitors in the employ of the excess indicator company were supplied with such information regarding prospective customers as was available and were provided with blank contracts under the lighting company's name. The size of the contract which these men could attack was limited, however, by the fact that the indicators are regularly made in ratings only up to 10 amp and on special orders to 20 amp. The lighting company specified that no contracts should be closed calling for a connected load of less than 100 watts. For commercial customers a gross rate of 1.35 cents per watt connected was quoted, 0.1 cent discount being given for payment of bills before the tenth of the month. Residential patrons, as short-hour users, received a rate of 1.1 cents per watt connected, with a 0.1-cent discount for prompt payment.

In hardly any case has the company taken contracts for wiring new houses, having relied upon the contractors to handle this business. The friendly relations maintained with the contractors have gone far in aiding the company to secure the small customer.

From the customers' standpoint the electrical energy purchased on this flat-rate contract is inexpensive. In the average commercial installation the lamps are operated 9 hours each day for 26 days in a month, making a total operating period of 234 hours. Assuming that the connected load is 1 kw and the net price is 1.25 cents, the monthly bill will be $12.50, indicating a rate of approximately 5 cents per kw-hr. As the hours of operation are increased, the kilowatt-hour rate to the customer is graded to become more favorable, until, upon reaching the maximum monthly period of operation, 720 hours, the rate is about 1.4 cents per kilowatt-hour.

For the company the flat-rate offer is also attractive. A 1000-watt installation earns each month $12.50, or $150 annually. When it is considered that many companies earn less than $50 per connected kilowatt per year the desirable nature of such business will be readily apparent. There are other advantages accruing from the use of the indicators. For instance, a considerable reduction in transformer ratings has been noticed in communities where the majority of customers are using the indicator, for although each customer may have installed on his premises a large number of lamps, he can operate only a limited number at any time. No trouble is reported from customers endeavoring to use electrical appliances of high wattage ratings on circuits connected for light indicator loads. The experience has been that as soon as the customer is educated to the point where electrical appliances are desired his business can be obtained on a metered basis.

The 2800 flat-rate customers on the Pittsburgh Company's circuits have added in round numbers 500 kw of connected load to the system. Thus these are really small customers, as the average connected load per customer is about 180 watts, and the average monthly bill is something over $1.90.

Another form of contract in Pittsburgh requires that the consumer pay a "fixed charge" of 15 cents per month for each room and main hall on the first floor, 5 cents per month for each room on the upper floors, and 2 cents for each lamp outlet on the premises in excess of fifty. Upper halls and bathrooms are not charged for. In addition, the customer agrees to pay an energy charge of 6 cents per kilowatt-hour for all energy consumed. It is specified that the minimum fixed service charges shall be 65 cents per month. Data collected by the company show that this charge averages about 75 cents. This contract was introduced for the benefit of the residential patron whose monthly bill was more than $1.50, and is recommended to those wishing to withdraw from the flat-rate contract. Although at the time of introduction of this contract it was thought that the revenue of the company would be decreased, it works out in the opposite direction.

One or two incidents may be noted, as "flotsam and jetsam" of the great electric era of experiment, opportunity and introduction. Thus a woman in South Bend, Ind., wrote to the household department of a Chicago daily newspaper to say that her neighbors expressed so much admiration for her electric flat-iron that she conceived the idea of renting it to them. The rate fixed for the use of the iron is 10 cents an hour. This enterprising housewife is also the proud possessor of an electric vacuum cleaner. This she rents out also, charging for its use 15 cents an hour. Thus the neighbors have paid the business-like owner of these devices enough to reimburse her for the first cost and also supply her with some extra pin money. As one of the electrical journals remarks, "this plan would seem to be all right from the electric-service company's point of view, but probably not exactly to the liking of the manufacturers of these devices." But it will probably all work out right in the end. Take another instance. An enterprising negro bootblack in a small Indiana town solved the problem of making his 6-in electric fan a paying proposition for himself as well as for the central-station company. While he is putting the polish on the customer's shoes the fan is placed where its breezes cool the perspiring patron. The base of the fan is not fastened down, so that later, when shoes are to be dried, the breeze from the whirling blades can be directed against the footware. At times when customers are few, the bootblack uses the fan for his personal comfort. A demonstrator for the United Electric Light & Power Co., New York City, who called at a customer's home to explain the proper method of using an electric iron, was met at the door by the maid and to her described the purpose of her visit. The maid replied that she herself knew well enough how to operate the iron, but she said she did not favor its use as it worked "so fast" and did the ironing in such a short time that her mistress afterward always found extra work for her to do. She hoped therefore that her mistress would not buy the new iron. Not daunted, however, the demonstrator made the sale and has since been using the story in gaining other orders.

Note has been made in previous years of the use of central-station energy directly in crematories on the Pacific Coast, as at Oakland and Pasadena. Electric service, it is found, can be employed in other ways, and the Woodmere Cemetery Association of Detroit is now using a motor-driven compressor to furnish air for operating the oil jets in its crematory and concentrating the flames on the body being consumed. Air from the compressor is also thus used to separate the human ashes from the wood ashes of the casket. The motor compressor set is capable of delivering 1600 cu ft of air per minute against a pressure of 2 lb per square inch.

A window display which shows how to save labor in the home is in itself always attractive to housewives, but if the interest of the children can be separately enlisted, the mothers will be dragged to the window by their youngsters to wait till the little folks have feasted their eyes on the wonderful sights therein. Such was the display last fall used in the window of the Elwood Electric Light Co., at Elwood, Ind., a town of 11,000 inhabitants. The two lay figures, one with an old washing machine and the other using the new motor-driven type, pointed out the way to make the Monday washing an easy task, while in the foreground two miniature electric trains operating from a third-rail industriously plied back and forth on the figure-eight track. On the miniature pole line the type of overhead construction adopted by the American Gas & Electric Co.'s properties was rigidly followed, white, brown, blue and yellow beads being used to distinguish primary circuits, secondary circuits, arc-lamp circuits and ground wires respectively, as in the Elwood company's own outdoor plant. The electric trains, of course, were a never-failing source of interest to the younger generation and were the cause of many women stopping to look at the display who would otherwise have hurried past with but a casual glance. Attention was called to the window display by newspaper advertising in the local papers, and while the subject was before the minds of the citizens, solicitors followed up the opportunity, with the result that about thirty washing machines were sold in less than four months.

From the standpoint of electric-motor application, the First Baptist Church of Worcester, Mass., is one of the most completely equipped edifices devoted to religious purposes. In addition to the usual motor-driven vacuum-cleaning, organ-blowing, ventilating and exhaust fan equipments, the auditorium is provided with a motor-operated curtain, which separates the main body of the church from the Sunday-school room. The curtain is of wooden construction, 8 in thick, and is 36 ft long, its height being about 30 ft. It weighs about 6000 lb, but through the use of counterweights is easily run up and down by a 4-hp, 550-volt direct-current motor placed among the rafters of the church. The curtain can be raised or lowered in thirty-eight seconds without the slightest noise, the motor being controlled by a starting box at one side. It is customary to raise the curtain during the singing of the final hymn, if the Sunday-school room has been isolated during the remainder of the service. and the majority of the congregation, whose backs are turned to the curtain, do not become aware of the change unless the day is dark enough for the additional supply of natural light to attract attention. Service is supplied by the Worcester Electric Light Co.

Some very interesting data as to service to small communities, such as those of less than 5000 population, was given in a paper read last fall before the Colorado Electric Light, Power & Railway Association. The author, Mr. H. L. Titus, said that in a place with only 451 residence connections, his company had placed 390 electric flat-irons, 192 toaster stoves, 100 toasters and 42 heating plates, in addition to a number of electric cookers, washing machines and vacuum cleaners, all operated at the regular lighting rate. In addition the company had placed fourteen private pumping plants of sufficient rating to care for the sprinkling of lawns, etc. From these the company received from $1.50 to $4.50 a month on an 8-cent rate. An attempt had been made to introduce the electric cooking range and the hot plate, and twenty-four units of this character are now in service. The rates for this class of service are 4 cents per kilowatt-hour for electric ranges, with a minimum of $1.50 a month and 5 cents for hot plates, with a minimum of $1 a month. With these rates the operating cost does not become excessive, ranging from $2 a month for the hot plates to perhaps $7.50 a month for the larger ranges. A close basis for estimating the cost of electric cooking when talking with a prospective range customer is to allow 1 kw-hr per day for each adult person in the household and about one-half of this where the hot plates are used. Such work as this could be cited and duplicated from many other quarters, and is only one more instance of the manner in which complete electric service is invading the modern household.

EDUCATIONAL AND WELFARE WORK

It is almost needless to say that the educational and welfare work done by member companies in the Association is continued and carried on with full swing of activity and progressiveness. The work of the Association itself in its new Educational Committees and its Accident Prevention Committee is reported on elsewhere.

On January 1 a pension system similar to that of the Commonwealth Edison Company was announced by the Public-Service Co. of Northern Illinois. Pensions are given to three classes of employees—those at least fifty-five years old who have worked thirty years for the company; those at least sixty years old whose service is twenty years, and those at least sixty-five years old who have a record of fifteen years of service. In computing the annuity, that consecutive five-year period when the employee received his highest salary is taken as the basis. The average pay for that period is multiplied by the number of years of service, and the annuity is 1.5 per cent of the product.

The officers of the New York Edison Co., recently made public the tentative outline of suggested plans to enable its employees to become stockholders through the incorporation of a new company to be known as "The Employees' Investment Co. of the New York Edison Company." By-laws of the new corporation will provide for a board of directors and an investment committee, both to be composed of employees. Membership on the part of the 6000 employees will be optional. Members will authorize the company to withhold from their weekly salaries whatever amount they desire to invest. The Edison Company will guarantee the safety of the funds and bear all expenses connected with the work. The directors of the Edison Company will be asked to set aside a large number of shares of stock for the employees after the new company is incorporated, as was done by the United States Steel Corporation ten years ago, when 25,000 shares of preferred stock, then selling in the open market at 109, were set aside for employees at par. The plan outlined for the Edison employees is the outgrowth of a savings and building loan association which they started a little more than a year ago, and which now has more than 1500 members. The new plan is attracting much more attention among the employees than the building association, and a large percentage of the women, who took little interest in building loans, are eager to become investors. In the building loan association, the employees are now saving more than $125,000 a year. Indications are that this amount will be exceeded greatly under the new plan. One of its good effects will be to enable employees to avoid loan sharks when hard pressed financially. In the new company, as in the building loan association, members will be permited to borrow for emergencies at a reasonable rate of interest.

At a meeting of the Brooklyn Company Section of the National Electric Light Association on December 9, Vice-president W. F. Wells, of the Edison Electric Illuminating Co. of Brooklyn, announced that the directors of the company at their last meeting had voted to continue the policy of profit-sharing which had been in force for three years previous. This involves the distribution among over 900 employees of approximately $60,000. The profit-sharing is made on a basis of years of service, the employee who has been with the company two years receiving 2 per cent of his annual salary and the employee of five years or more 8 per cent, with varying percentages between. This year more than 400 employees will receive 8 per cent on their salaries. Much of the employees' profit shares of previous years is invested in the Edison investment fund, conducted by the company without any administrative charges, and it has been paying employees 6 per cent compounded quarterly. This fund, with the profit-sharing of 1913 added, will exceed $300,000, the property of approximately 1100 employees.

It should also be noted that any employee of the Edison Electric Illuminating Co. of Brooklyn may select any course at any school or college in New York City which will be of assistance in his or her work with the company and have the tuition fee, subject to approval of the company's scholarship committee, paid in advance by the company, the cost being deducted in weekly amounts, sufficient to pay for the course at its completion. If at the end of the term the employee passes the examinations with a grade of 66 per cent or better, the amount deducted from the salary list will then be returned to the employee, the company itself defraying the cost of instruction. If, however, the grade received falls below 66 per cent, no refund will be made. Where an employee severs his connection with the company during the school year, the amount paid for tuition, less the sum already deducted, will be taken from his salary. Exception is of course made in the case of employees required to take up unforeseen duties, owing to transfers within the company. Last year 136 employees, male and female, signified their intention of taking courses of instruction under the conditions above outlined. Of this number 113 actually started, and fifty-one of these students completed their courses successfully.

At the September convention of the New England Section of the Association, held at Burlington, Vt., Mr. Herbert W. Moses, head of the Welfare Bureau of the Edison Electric Illuminating Co. of Boston, Mass., outlined the results obtained during the first year of the latter's work. This bureau now has a superintendent, a librarian, a medical director, a chief clerk, an outside inspector and a stenographer. Its employment division was opened on February 1st, 1913, and up to July 1st, 1566 applicants had been received. Medical examinations were given to 497, of whom 435 were accepted, the ratio of rejected applicants on this examination being about 10 per cent. Such preliminary scrutiny later saves the company from paying the corresponding sick and death benefits.

An analysis of the pay-roll shows that 837 persons left the company's employment during the first year of the Welfare Bureau's work, and 1002 new employees were added to the organization. Of those who left the service 472 resigned and 365 were discharged. Mr. Moses outlined the scheme of sick and death benefits in force at Boston. The company provides even more liberally for its staff than is required by the Massachusetts workmen's compensation act. During the year ended June 30, 1913, the company paid $4,201 in accident benefits, including two deaths. In five months it paid sick benefits to the amount of $2,534, and in nine months there were nine deaths, on which $2,917 in benefits was paid. The company doctor saw 878 patients among the employees during the year and made 1343 calls, giving free medical attention in each case. Employees lost 1707 days on account of illness and in all there occurred 720 accidents on the system during the year, counting minor injuries. Of this number 450 were accidents to employees, two having been fatal. The remaining 270 accidents were suffered by the general public, nine being fatal. The latter class of accidents is largely attributable to the fact that the company has much of its construction work done by contract, for of these accidents all but ninety-three were incurred by the employees of sub-contractors. No time was taken from work in 343 of the accidents to employees, while in the remaining 105 cases 1387 days were lost. The maximum time lost was 187 days for one employee. Further study of the company's accidents shows that the maximum number occurred between noon and 6 P M.

On March 15, 1913, the company began to lend money to employees in certain cases in amounts up to a maximum of $100 without charging interest, a fund of $1,500 being set aside for this purpose. The total loans under this arrangement had been forty, aggregating $1,860, of which ten have been repaid in full, leaving thirty-four outstanding, aggregating $1,113. The work of the whole bureau for its first year has cost about $30,000, but the results contribute to increased efficiency and *esprit de corps,* and the company expects to expend about $50,000 in the work during the second year. Fewer and shorter absences and quicker recuperation in case of illness have been secured, and the standard of employees is constantly being raised.

The Boston Edison Company has, however, developed even more interesting plans for the benefit of its employees in one of the most ambitious efforts ever made by a corporation in the central-station field to provide for the social intercourse and welfare of its working force, and facilitate the forming within its ranks of a wider personal acquaintance among them, all tending in the ultimate issue to better public service. Twenty years ago the pay-roll of the Edison Electric Illuminating Co. of Boston showed a total of 228 employees, all in close touch. To-day there are not far short of 2000 scattered over 700 square miles of territory, and the aim of the new plan embodied in the Employees' Welfare Buildings is to provide for them all a social center, a home, a focus for many useful activities and social relationships, and an opportunity for all to know each other and the company better.

The property buildings to be erected are three in number—the Library, the Recreation Building and the Auditorium and Dining Hall—the purposes of each being broadly indicated in the designation. Relative to each other the buildings occupy three sides of a large square, the Library being located at the extreme eastern boundary of the property facing towards the present Service Buildings. The Recreation Building is the central one of the group, being on the south side of the square, facing Massachusetts Avenue. The Dining Hall is located on the western side and faces the Library, the back of this building overlooking the present Laboratory of the company.

The distance between the piazzas of the Library and the Dining Hall across the open court is 225 ft, and in this space three tennis courts and a putting green for clock golf are being provided. On the open side of the square, directly opposite the Recreation Building, in the sunken area between the tennis courts and the Massachusetts Avenue border of the property, will be a flower garden sufficiently large to supply all kinds of flowers for use in and about the buildings.

Perhaps the most imposing and attractive feature is the great expanse of piazza space which extends along the fronts of all three buildings, around one side of the Library and Dining Hall, and continuing from one building to another by means of a circular walk. These piazzas are all covered and are brick paved, being 16 ft wide and having a total length of 683 ft.

The buildings are all fireproof construction, having concrete foundations, walls of terra-cotta blocks and slate roofs. The outside of the buildings will be of cement in rough or stucco finish. The general inside finish of the walls will be scoured with plaster, and the principal inside standing finish will be cypress. Elaborateness of design and ornamentation has been eliminated, thus making it possible to produce a somewhat plain but substantial group of buildings where comfort and ease will prevail.

The equipment of the buildings provides practically every convenience common to the best clubs:—a first-class restaurant operated by the company, open 24 hours a day every day in the year, private dining-room for the ladies, spacious accommodations for entertainments, dances and the like, four bowling alleys, three pool tables, one billiard table, private lockers for both men and women, shower-baths, large lounging rooms with open fire-places, a well-appointed library, writing room, committee, card and checker rooms, thirteen sleeping rooms, and suitable coat rooms and toilets.

Much consideration has been given to out-of-door life. In addition to the three tennis courts and putting green located in the area directly in front of the buildings there will be a baseball diamond laid out in the rear of the grounds. Piazza furniture of various types will be provided for the convenience of those who enjoy sitting around out of doors.

The operation of the enterprise is in the hands of a new department, corresponding to others in the company; and there will be a superintendent in charge, with a competent staff. There will be no dues or contributions of any kind, outside the small fees charged for lockers, bowling alleys, tennis courts, billiard tables, rooms, and the like. Many interesting features are embraced in the comprehensive and thought-out details, such as the renting of umbrellas, the sale of standard packages of food at wholesale prices, and even the sending out of lunches to workmen "the nature of whose duty, or in cases of emergency, prevents them from having a regular lunch hour." Of course, everything will be cooked electrically, and "the kitchen will be used as a model by the Sales Department in showing prospective customers the advantages of electric service for cooking."

The working out of this undertaking, which gives the employees a club-house of their own, with the minimum of supervision necessary to keep it going in good shape, will be watched with interest nothing short of intense.

A feature of the new hundred thousand dollar building of the Penn Central Light & Power Co., Altoona, Pa., is its fine assembly room which occupies one-half of the third floor. Seats are provided for 400 persons, and at frequent meetings of employees topics of courtesy, public relations, welfare work, etc, are discussed. The room is also equipped with a pianola and has a highly polished dance floor and the employees are privileged to listen to the music and to dance there daily between 12 noon and 1:30 P M.

When the offices of the Merchants' Heat & Light Co., Indianapolis, Ind., were recently moved from the first to the second floor of the building because of the necessity for more room, it was decided that the young women employees of the company should be well taken care of. With that end in view, a 15-ft by 15-ft rest room was built at one end of the office, the partition being of board, so that there would be absolute privacy. The company bought a dining table, chairs, knives, forks and spoons and also gave the girls an electric samovar for tea making, an electric stove and toaster and a chafing dish. Each day the young women prepare their lunches in this room, and it has been found that the cost does not exceed $1.50 per week, or about 15 cents per girl. The company pays for all the bread, butter, tea, sugar and cream, which cost about $1.50 per week. Eleven girls are employed and seldom less than ten stay for lunch. The girls figure that they save at least 10 cents each per day, which in the course of a year means a saving to them of at least $300. Not only is the economy appreciated, but in bad weather they find it very convenient not to be compelled to go outside for their lunches.

Employees in the storerooms of central stations where the distances traversed are relatively large might find their work facilitated by the aid of roller skates, a novel departure which is actually in use with considerable success by the Union Street Railway Co., of New Bedford, Mass. This company's storeroom attendants are fitted with skates to accelerate their movements, and they thus save considerable time in getting at stock. When one of the men receives a request for material at the delivery window, he skates back to the section of the storeroom containing the required article and promptly returns with it to the delivery window. The use of the skates does not hamper the storeroom employees in mounting ladders for the purpose of reaching elevated bins in which material may be stored, as experience has shown that they are able to mount ladders to reach such places without removing their skates.

One other feature of work has been that carried on by the industry in connection with Young Men's Christian Associations, a striking example of which is seen in the Y. M. C. A. Finance Forum in New York City, whose work in educating and informing a large and important part of the public as to the real conditions under which central stations and other public utilities are carried on has been engaged in by a large number of our members, including such notable men as Samuel Insull, H. L. Doherty, Arthur Williams, C. A. Coffin, W. H. Gardiner, W. D. Kerr, F. T. Homer, and S. Z. Mitchell. No more important work could possibly be done, and several of the speeches and addresses have found a place in the Association *Bulletin* within the past few months.

There are many lurking possibilities of good and usefulness in such efforts. Thus, for example, a feature of the salesmanship course of the Boston (Mass.) Young Men's Christian Union given during the past winter months at the headquarters of the organization, was an electrical appliance sales evening, which was held under the auspices of the Boston Edison Company. On this occasion the stage was completely equipped as an electrical appliance store, in charge of Mr. W. G. Stetson, superintendent of the appliance department of the Boston company. An informal playlet was given, in which Mr. Louis D. Gibbs, superintendent of advertising of the company, assumed the part of a "prospect" about to provide his residence "with lots of light," and the hit of the evening was the witty and impromptu dialogue between the two "stars," resulting in the purchase of an electric range, vacuum cleaner and several other appliances on an instalment basis. Washing machines, electric-heating devices and special lighting equipment were shown in full operation, and two women demonstrators from the company's staff assisted in "convincing" the "prospect" as to the cleanliness, simplicity and economy of electric service. The questions asked were specially adapted to bring out the ease with which the layman's household, from mistress to maid, could avail itself of electric cooking, lighting, heating and motor equipment, and at the close of the short act the two principals gave the audience talks upon salesmanship and advertising. Technical terms were tabooed, and the large audience maintained an appreciative interest from start to finish. There is certainly a most admirable suggestion here for other performances along the same line, and in the same field of effort.

(The second part of this Report, devoted specially to the subject of hydro-electric development and power transmission. will be found in the Technical volume.)

President McCall: A motion is in order to accept the Report of the Committee on Progress.

(On motion duly made and seconded, the Report was accepted.)

The next business is the Report on the Question Box by the Editor, Mr. S. A. Sewall, of New York City.

REPORT ON QUESTION BOX

The past year of the *Question Box* has been a very successful one so far as the numbers of questions and answers go. In fact these numbers far exceed any in previous years and the interest shown is certainly very gratifying. The actual figures from June, 1913, are 254 new questions, 1296 answers and 746 contributors.

Just how useful the *Question Box* is to our members is rather a difficult matter to determine. There is no doubt that among our membership there would be several different answers to this, some favorable and some unfavorable. The encouraging part, which makes us believe that the *Question Box* has a place in the Association work, is the increasing support that we are receiving, and also the interest taken by the big men in the industry.

Our present plan is to get the varied knowledge and experience of the many rather than the personal and special knowledge of the few. The rules of the *Question Box* are few and protective only, and what editing is done is so clearly for the common good and for the best practice and results, that we have never received any criticism on this line. It is aimed to keep the *Question Box* at a high level in order that it may become more valuable from year to year.

Recently we have been criticised for using questions and answers which brought out references to the products of the different manufacturers. Fear has been expressed that we might easily allow the pages of the *Question Box* to be used to settle a "grouch" or to advertise. However, we do not believe that we have been taken advantage of in this manner, for questions are undoubtedly earnest calls for the experience of other companies with certain appliances which must be named, and we cannot see any objection to discussing them or to naming those which are not well known. We believe that all such questions asked in good faith should be answered. It is true that we answer many such directly, sending advertisements, news notices and letters from manufacturers. We use in the *Question Box* such questions as seem to us to be of general interest and likely to be noted by many of our readers.

The confidence some of our members have shown in the *Box* is flattering. We have been asked how to build power-plants, to operate city pumping-plants, to construct buildings. As we believe these questions were asked in all cases in good faith we have referred them to those who we felt could and would give information to be relied upon.

As you all know, the *Question Box* depends entirely on the cooperation of our members for its success, and we certainly have had splendid support from them. We have referred many questions to the Chairmen of the different committees, and in every case, replies have been high class, giving valuable assistance to the members. As I said last year, our idea is to get in information which gives the experience of members, since technical questions are all answered in handbooks and other forms of reference books.

Our contributors are now organized. We send advance sheets to over 300 different member companies and have in these some one man who makes himself responsible for replies. It happens often that a big and very busy man will send us copy on a subject that has struck his fancy. Naturally we like this, but we are glad to get copy from any man who knows his subject and has a suggestion to make.

We are about to put into operation a plan which will involve the Company Sections. This is, in brief, to have the new questions brought before each Section at an early meeting, there discussed and the gist of the discussion sent to us by some one appointed member, qualified for the task. In this way we shall get something more than the opinion or experience of one or two men. The reply will cover the experience of many, with weak points well threshed out in advance.

Another plan which we are almost too modest to mention is to have the member companies offer a small bonus for good work done for the *Box*. One or two companies in the organization do this already, as has been described in a recent number of the BULLETIN, and it certainly would arouse interest. Necessarily, if a sum even as small as one dollar were offered for unusually good work, some supervision would be needed, and here is a weak point to be very carefully watched. The small sums of money however, could not become burdensome to any company. It is hoped that these plans, now very hazy, may develop into something useful and practical during the coming year.

President McCall: The Report is before you. Are there any questions, or is there any discussion?

A motion is in order to adopt the same.

(On motion duly made and seconded, the Report was accepted.)

I think one of the annual pleasures of the visitor to this Convention is to hear a paper of any kind prepared and read by Mr. Paul Lüpke; and the paper he has written for us this year entitled "Safety First" is, I am sure, in his usual vein. It is a very great pleasure to have him here this morning to present it in person.

SAFETY FIRST

Thoroughly do I appreciate the fact that all of you have heard that said before. However, but recently I read this statement by Professor William Howard Taft, made, one might surmise, under the guidance of severe personal experience:

"Newspapermen and other publishers and writers know that the people do not learn facts and arguments on any subject by one announcement, and that it needs constant effort of iteration and reiteration to send the matter home to the people it is wished to reach."

I consider that absolutely true, and the authority of sufficient weight, to justify the choice of my text. Again I read another statement in an editorial of a late issue of *Power* thus:

"The greatest factor operating toward the prevention of accidents is not the prevention device but the 'prevention spirit.' "

Regardless of the authority I consider that true also, and on the basis of that truth I shall endeavor to contribute a mite toward rousing the prevention spirit.

The wave of broad humanity and the strenuous campaign for the elimination of waste that, of late years, have swept the country naturally unite in an earnest effort for the suppression of accidents, because accidents and their aftermath loom large in the accounts of human suffering and material loss.

Those who guide and direct the affairs of men are fully alive to the issue, and what they can reasonably do to further provision of the prevention device is being done. It is meet then that their efforts be upheld and fostered by a liberal development of the prevention spirit on the part of those who needs must follow and obey.

The time is ripe for the rank and file to realize that, if they expect to enjoy securely a more substantial share of the profits of business, they must assume an equal, substantial share of the responsibility of creating a profit. Heads I win and tails you lose, has never been considered a fair bet.

"The increased cost of doing business and the new liabilities that are created under recent compensation acts, deserve very careful attention by all utility companies," says the *Electrical World*, and well we may add, *"and all their employees."* Even all those little hurts, that, when they happened to us when we were just kids, mother used to cure with a kiss, the majesty of the law now, that we are men grown, raises to the dignity of full-fledged accidents, to be fully covered by a quadruplicate report, followed up by the company doctor's examination, and painstaking claim department investigation, fully fortified by sworn affidavits of the principal and promiscuous witnesses; therefore, don't let's have any more of them than we can possibly help. They are only a drop out of the bucket, but the constant dribble may have drained it dry when we really need a drink.

Now let me put the question squarely: Is "Safety First" a live issue with you or merely a dead phrase? Suppose we apply a simple test. You stumble over the frayed edge of a mat in front of the switchboard and come near having a bad fall in a tight place; do you say "darn it!" and pass on, or, do you see to it that the spot is fixed up so that neither you nor he who follows will stumble there again? In the first case you do not realize at all what "Safety First" means, in the latter you have caught the true spirit. Check yourself up on the very next occasion and find out where you stand. If you find yourself wanting, hold a personal meeting and reason out why.

Let me help you by pointing out a few of the reasons I have found for the lack of the prevention spirit. First we have thoughtlessness pure and simple. The fellow afflicted with it has never outgrown the class of the care-free kid merrily skipping along the sidewalk eating an orange or a banana and strewing the slippery peel under the feet of the unwary. He needs just a good shaking up to make him realize that his short-pants days are over, and that the world's work in which he now takes part is serious business.

Next we have the man who knows well enough what he is doing, when by careless or slipshod work, in a devil-may-care mood, he leaves behind him traps that sooner or later will be sprung and catch an innocent fellow employee. If you are of that character take heed and change your ways speedily, and, if you are not capable of conceiving a higher motive, bare self-interest should be all-sufficient, for, get it through your head, that when you come with requests for higher pay, better working conditions and all that sort of thing, hemming and hawing and holding back on the part of the company is only too often caused by the feeling that there is something due in return, in line with the prevention spirit, which it does not get.

Again, we have the man over-willing to take a chance; but, mind you, business is no poker game. The inch that was as good as a mile for once, may vanish altogether on the very next job. Stick to the mile while you still have the chance. Familiarity breeds contempt is such a commonplace phrase, we almost forget that it is still true. Courage is needed to let the heedless appraise you a coward, for the moment, for taking a righteous, safe course, when a display of foolhardy recklessness might lead them to make you a one-day hero is of the highest order. The man who can keep his head level in an emergency and instantly recognize a true "Carnegie medal occasion" that demands taking a risk, is a real hero.

And last let me mention that abomination, that grinning nightmare, the practical joker. Nowhere else does dire tragedy tread so closely and so frequently upon the very heels of supposedly harmless fun than in the working out of a practical joke. In nothing can all good fellows join hands to better purpose than in driving into limbo, where he belongs, that confounded ass, the practical joker.

And yet, all this is but chopping away at the branches, that for all I know, may cause the tree of evil to sprout new shoots. To get at the root of the matter we must delve deeper. The greatest help toward the prevention of accidents is concentration of mind upon the task in hand. Concentration presupposes peace of mind. Common foes of that are the loan shark, domestic war and dissolute habits. All these cause worries, worries distract, an ddistractions leave a trail of the worst accidents in their wake.

In the name of common sense, live within your means. It is the best means of getting more to live on. If you are in real distress, and, God knows, there are circumstances enough to cause it, go to your employer with it and state your case frankly; he will listen and he will help you if you are at all worth while. He is intelligent enough to know that he but serves his own interest if he helps you.

Try to kill off the gray grouch in your family relations; make it plain to your wife that if she sends you off with a cheerful kiss she will stand a vastly better chance of having you come back whole than if she lets you go with a nagging frown that makes you bang the door behind you and pursues you all day long.

And above all keep yourself fit. For all kinds of sports we train, we take particular precautions to guard our health; why then ignore the axiom that life itself is the most exacting sport of all. Some years ago you worked twelve hours out of twenty-four, now you work ten, nine or eight. It is your duty to yourself, your family and your employer to put those extra hours-off to proper use. Your body is your own, you have had it for years, and by this time you should know what is good for it. The more the doctors tell us about germs the surer we become that we shall never be able to keep them out absolutely. Take rational care to keep out as many as you can and keep your system in fighting trim to cope with the rest, for only the fit in mind and body can be true exponents of the prevention spirit.

The agitators, the muckrakers and the trouble makers have appeared in full battle array, and their tongues are persuasive; they have filled our ears with their cries about our wrongs and misdoings. Perhaps they were needed to stir us up, to bring about a universal recognition of higher ideals; but it is now the dawn of the day for the constructive work of recasting business on the basis of these higher ideals. Such work must always be done by conservative men; they have been, and still are, hard at it. And, therefore, those among the rank and file who can manage to shake themselves up out of the listlessness of the dull routine of mere eating, working and sleeping, who feel in themselves the stir of the new times, should show that they have the courage of their convictions. They should speak out in open meeting before their fellows and do their part in spreading the obvious truth that the interests of employer and employee are identical, that neither the one nor the other can prosper if business is hampered and hurt. In no other matter can a better start be made than in a joint endeavor to eliminate the waste and ruin that result from preventable accidents. Nowhere is that mutual interest more self-evident and in no other other way can the good cause be promoted more readily and thoroughly than by rousing the prevention spirit.

PRESIDENT McCALL: Gentlemen, as everything else which Mr. Lüpke writes, this paper is full of meat. I should be very glad to see it published throughout the entire country just as it is written.

(Adjourned)

SECOND GENERAL AND FIRST EXECUTIVE SESSION

WEDNESDAY, JUNE 3

THE CHAIRMAN, PRESIDENT MCCALL: I call upon Mr. Arthur Williams, of New York City, Chairman of the Public Policy Committee to present his Report.

MR. WILLIAMS: I beg, Mr. President, to simply present the Report this morning, as has been the practice in past years, with the understanding that it will be read this evening at the Public Policy Session by Mr. Samuel Insull, at the request of the Committee. The report has been printed after approval by the Public Policy Committee. It covers broadly the relations which we recommend between the public and our members, and carries out somewhat in detail the policies recommended, or the policies which have heretofore prevailed throughout the industry.

PRESIDENT MCCALL: Gentlemen, you have all probably seen this Report, as it has been printed and circulated throughout the convention hall. At this time a motion is in order to approve it.

MR. W. C. L. EGLIN, Philadelphia: I move that the Report as presented by the Public Policy Committee be approved.

(Motion seconded and carried.)

The next business is the presentation of proposed amendments to the Constitution, by the Committee on Constitution, Mr. Frank W. Frueauff, of New York City, Chairman.

MR. FRUEAUFF: Mr. President and gentlemen: Several suggestions have been made to the Committee on Constitution, regarding certain proposed amendments to the constitution, and I would present them at this time.

REPORT OF COMMITTEE ON CONSTITUTIONAL AMENDMENTS

Amend Article IV Section 2 first sentence to read:

The President, Vice-Presidents and Treasurer shall be elected from Class A or Class B members to serve one year from July 1st, or until their successors shall have been elected.

Amend Article IV Section 3 first sentence to read:

The Executive Committee shall consist of the President and Vice-Presidents, of the Treasurer and the retiring President and of nine (9) members elected from Class A or Class B.

Amend Article IV Section 6 first sentence to read:

The Treasurer shall perform the duties assigned to him by the Executive Committee and subject to its approval.

The purpose in all these amendments is to make the Treasurer of the Association an elective officer and to give him a vote at meetings of the Executive Committee.

Amend Article VII Section 1 first paragraph to read:

The annual dues of Member Companies (Class A) in cities and towns of less than 5000 population shall be $10; in cities and towns of 5000 and less than 10,000 shall be $15; in cities and towns of 10,000 and less than 25,000 shall be $20; in cities and towns of 25,000 or more shall be $25 plus 1/50 of 1 per cent of the gross earnings from the sale of electric current by the company for the preceding calendar year.

Amend Article VII Section 2 to read:

The annual dues of Class B members shall be $5 including membership in a Geographic Section and in a National Special Section. Class B members shall receive without cost such publications as shall be approved and authorized by the Executive Committee for distribution through a National Special Section.

Amend Article VII Section 4 to read:

The annual dues of Class D members shall be fixed by the Executive Committee but in no event shall the dues of any such member exceed $2,500 per annum.

Amend Article VII Section 5 to read:

The annual dues of Class E members shall be $5 including membership in a Geographic Section and in a National Special

Section. Class E members shall receive without cost such publications as shall be approved and authorized by the Executive Committee for distribution through a National Special Section.

These second amendments are recommended to enable any Class B or Class E member to belong to the particular Special Section which he may care to select without the payment of any extra dues, and to give him the full benefit of the work of such section.

To compensate for this loss of revenue from individual members, to add to the Association's annual revenues for the carrying on of further important work of the industry, and to enable the Class A and Class D members to contribute a larger proportion of the Association revenues, it is recommended that the percentage dues paid by the companies in cities of over 25,000 be increased and that the manufacturing and supply companies pay annual dues, within reasonable limits, upon a basis to be determined from time to time by the Executive Committee.

Respectfully submitted,

FRANK W FRUEAUFF *Chairman*
W C L EGLIN
W W FREEMAN
R S ORR
H H SCOTT
H T SANDS

MR. FRUEAUFF: Following the usual custom, I move to refer these proposed amendments to the Constitution to the next Executive Session for action.

(Motion seconded and carried.)

PRESIDENT MCCALL: The next business in order will be the Report of the Treasurer, Mr. W. F. Wells, of Brooklyn.

Mr. Wells then presented the following statistics:

NATIONAL ELECTRIC LIGHT ASSOCIATION

BALANCE SHEET AS AT DECEMBER 31, 1913

ASSETS

Furniture and fixtures (less depreciation)		$2,691.41
Inventory of Publications		
Cost of Association publications	$2,171.29	
Cost of Commercial Section publications	1,418.41	3,589.70
Investment in Securities		
5M Minneapolis G. E. Co., 5% bonds, Dec. 31, 1934	$4,920.00	
5M Commonwealth Ed. 5% bonds, Jan. 1, 1943	5,143.75	
4M Kings Co. E. L. Co., deb. 6% bonds, Mar. 1, 1925	4,450.00	14,513.75
General Cash Fund		
On deposit with Astor Trust Co., N. Y.	$5,344.10	
In office for petty disbursements	200.00	5,544.10
Accounts Receivable		
Interest receivable	$554.10	
Fixed dues receivable, Association	4,394.00	
Fixed dues receivable, Commercial Section	260.00	
Fixed dues receivable, Canadian Section	938.00	
Association publications	567.86	
Commercial Section publications	510.29	
Miscellaneous accounts receivable	451.30	7,675.55
Total		$34,014.51

LIABILITIES

Accounts Payable		
Sundry creditors, Association	$9,695.06	
Sundry creditors, Commercial Section	985.21	$10,680.27
Prepaid Dues		
1914 Dues paid in advance		$299.68
Unlocated Receipts		
Unlocated cash receipts		$301.26
Total liabilities		$11,281.21
Reserves and Surplus		
Reserve to provide for investment in securities	$14,513.75	
Surplus as at Dec. 31, 1913	8,219.55	$22,733.30
Total		$34,014.51

NATIONAL ELECTRIC LIGHT ASSOCIATION

INCOME ACCOUNT, YEAR 1913

EXPENSES

Running Expenses		
Salaries and wages	$25,652.58	
Rent	6,819.05	
Expressage and messenger	824.97	
Postage, telegrams and telephones	2,159.04	
Printing and stationery	1,596.10	
Bulletins	11,344.03	
Cost of publications (less inv.)	6,266.94	
Rate Research	3,729.78	
Rebates to Sections	9,564.16	
Committee expenses	552.64	
Commercial Section expense (includes Commercial Section publications less inventory)	8,828.80	
Hydro Elec. and Trans. Sec. exp.	61.35	
Miscellaneous running expenses	3,258.77	
Depreciation, Association furniture and fixtures	138.91	
Depreciation, Commercial Section furniture and fixtures	29.09	
Uncollectible dues	3,325.70	
Uncollectible publication bills	5.03	
Total running expenses		$84,156.94
Convention Expenses		
	1913	
Printing Proceedings (inc. exp.)	$15,418.36	
Preliminary papers	5,960.45	
Entertainment	4,875.40	
Miscellaneous	7,987.76	
Total convention expenses		$34,241.97
Total expenses		$118,398.91
Surplus for the year 1913		4,120.70
Total		$122,519.61

REVENUES

Revenue from Fixed Dues		
Class A members	$17,802.50	
" B "	48,070.00	
" C "	261.00	
" D "	5,120.00	
" E "	3,904.75	
Commercial Section members	3,552.00	
Hydro Elec. and Trans. Sec. members	50.00	
Foreign	250.00	
Total revenue from fixed dues		$79,010.25
Miscellaneous Revenues		
Sale of Association publications	$7,961.78	
Sale of Commercial Section publications	6,275.84	
Interest revenues	1,265.27	
Membership pledge	20.00	
Donations for special publications (Commercial Section)	None	
Rate Research	2,816.00	
Other revenue	269.28	
Total miscellaneous revenues		$18,608.17
Revenue Applicable to Convention Expenses		
Percentage dues, member companies	$19,985.84	
Registration fees	2,814.75	
Advertising	2,100.00	
Miscellaneous revenues	.60	
Total revenue applicable to convention expenses		$24,901.19
		$122,519.61

President McCall: I might say, gentlemen, for your information, that the item of convention expenses, $34,000, which appears to be a large item for expenses, includes the publication and distribution of all the Proceedings as well.

It is customary for a motion to be made to appoint a committee to audit the Treasurer's Report, this committee to report at the final Executive Session.

Mr. E. H. Davis, Williamsport, Pa.: I move that the Report of the Treasurer be received and that an Auditing Committee be appointed to report at the final Executive Session.

(Motion seconded and carried).

President McCall: In accordance with the By-Laws of the Association it is necessary on the second day of the Convention, to hold an Executive Session at which nominations for members of the Committee on Nominations shall be made. We will proceed to that business now. Nominations for a Committee on Nominations to elect officers for the ensuing year are now in order.

Mr. George B. Tripp, Harrisburg, Pa.: I nominate Mr. Frank W. Frueauff as a member of the Committee on Nominations.

Mr. J. D. Israel, Philadelphia, Pa.: I nominate Mr. John F. Gilchrist as a member of the Committee on Nominations.

Mr. Davis: I nominate Mr. W. H. Johnson, as a member of the Committee on Nominations.

Mr. Arthur Williams, New York City: I nominate Mr. Frank M. Tait as a member of the Committee on Nominations.

Mr. C. G. Durfee, Rochester, N. Y.: I nominate Mr. John L. Bailey as a member of the Committee on Nominations.

President McCall: Are there any other other nominations?

Mr. Eglin: I move that the nominations be closed.

(Motion seconded and carried.)

Mr. Davis: I move that the Secretary be authorized to cast one ballot for the nominees for members of the Committee on Nominations.

(Motion seconded and carried.)

The Secretary cast the ballot.

President McCall: The Committee on Nominations is duly elected, as follows: Messrs. Frank W. Frueauff, John F. Gilchrist, W. H. Johnson, Frank M. Tait and John L. Bailey.

The Chair will appoint as a Committee on Resolutions, Mr. John F. Gilchrist and Mr. T. C. Martin, to report at the close of the next Executive Session.

(Adjourned)

COMPANY SECTION SESSION

WEDNESDAY, JUNE 3

MEETING OF CHAIRMEN FOR THE PURPOSE OF EFFECTING A PERMANENT ORGANIZATION FOR THE INTERCHANGE OF INFORMATION IN THE INTEREST OF COMPANY SECTIONS

CALLED BY THE OFFICERS OF THE PHILADELPHIA ELECTRIC COMPANY SECTION OF THE ASSOCIATION.

Mr. Joseph B. Seaman of Philadelphia, temporary Chairman.

MR. SEAMAN: The meeting will please come to order. Gentlemen, as you no doubt know, this meeting is called to fill a long felt need, and to inaugurate a movement to get together in Section work. We have been very fortunate in securing as Chairman of this session, Mr. E. A. Edkins of Chicago, and I now have the pleasure of inviting him to the chair.

ADDRESS OF MR. E. A. EDKINS

In view of the small number of us here I do not think we ought to try to conduct this as a formal meeting. I do not see any occasion for it, and perhaps we can get at what we want by simply having an informal conference.

I might say just a few words before we start the general discussion. We have realized in the Commonwealth Edison Company that, to a certain extent, we are at some disadvantage in not being closely enough in touch with the work of the other Sections. At the time I was editing the "Round Table" I started an Exchange Department, and endeavored to review the work of other Sections and the papers presented at their meetings. That is done to a certain extent now. I was talking with Mr. Mohr about it the other day, and he was very much in favor of the plan and thought it ought to be carried out more generally in our company bulletins.

Here is the situation. We have Company Sections of varying sizes all over the country, all trying to work along similar lines, and all experimenting more or less with means to promote the loyalty and good-will of employees toward the company, to give them a good time, to bring them closer together, to afford them certain educational advantages in getting a wider familiarity with their work, and in general to create a stronger esprit de corps throughout the organization. Some Sections adopt one method and others another. We have all tried various schemes that have proved rather good, and we have tried others that have not panned out at all, and it seems to me that those who are interested in local Section work are overlooking a "good bet" when they do not get together at these conventions to exchange their experiences and compare notes. Some systematic plan of intercommunication might be arranged, say from month to month, or as often as occasion may require, between the Secretaries and the Executives of the various Company Sections, so that when one man strikes some good scheme that has been very popular and successful in his organization, it will immediately be passed around the circle to the others, and the literature will be sent to them with a full explanation of how the particular plan of entertainment or whatever it may be, was worked. If, on the other hand, they are considering a scheme that may have been thoroughly tested and proved impracticable in some other Section, the sooner they know about it the better, because it will prevent them from falling into the same mistake.

In the Commonwealth Edison Company we have worked out quite a number of plans in the last few years for stimulating the interest of our employees and "gilding the pill," if I may use such an expression, giving them something beside purely educational work, so that they are glad to come to the meetings whether they are particularly interested in the papers or not. If you can get the men to the meetings and give them a good time, the chances are that they will get something out of the papers, whether they know they are getting it or not. They will get something subconsciously; and, of course, those who are interested in educational work and are anxious to improve themselves, do not need any other inducement to attend the meetings. I think we have all encountered this difficulty, that unless we interlard the educational features with some entertainment, something that will appeal to the men and give them a good time, we find it pretty hard to get the crowd out; and of course, if we do not get it, we cannot but feel, and the company officials cannot but feel that the money being spent is more or less wasted.

I would suggest, instead of asking anybody to get up and talk formally, that we merely sit around here, as there are only about a dozen of us present, and I will ask that each of you in turn give us an outline of what you think ought to be done in the way of effecting a permanent organization. I would not advise an elaborate organization or anything of that sort, but it seems to me that we ought to have a standing committee of the National Electric Light Association that will appear with the others on the back page of the BULLETIN as the "Company Section Committee." This committee should be composed of representatives of company sections, whose duty it will be to see that the various methods of handling such Sections, and the best plans for promoting the kind of spirit we want to get among our employees, are exchanged among Section officers and also discussed at the annual conventions of the Association. Usually toward the end of each convention there is an opportunity to hold an afternoon session, and while perhaps the officials may feel a little bit doubtful because of the lack of interest shown at recent conventions, I think the trouble was that we did not have any steering committee or any formal organization.

We have not very much time this evening. We all want to go to the Public Policy meeting, and I think we ought to discuss among ourselves whether it is advisable to ask the officials of the Association to appoint such a committee. I should like to hear from all the others present.

MR. SEAMAN: I would move, Mr. Chairman, that we suggest to the Executive Committee of the National Association that such a committee be appointed, to stimulate Company Section organizations and the interchange of ideas between Sections throughout the year, and that a conference be arranged for at each of the National conventions.

CHAIRMAN EDKINS: A session?

MR. SEAMAN: A conference, arranged under the direction of this Committee. I put it in the form of a motion.

(Motion seconded.)

CHAIRMAN EDKINS: Is there any discussion on this motion?

MR. J. W. COWLES, Boston: The motion was that a committee be appointed by the Executive Board?

CHAIRMAN EDKINS: Yes, sir.

MR. COWLES: Now this committee would naturally be made up of the chairmen of the Company Sections, such as we here assembled are. Do we need any official action by the Executive Board to appoint such a committee in order to get together here?

CHAIRMAN EDKINS: We can always get together, of course.

MR. COWLES: I am not speaking in opposition to the motion, Mr. Chairman. It is not quite clear to me why we should ask for a committee.

CHAIRMAN EDKINS: There is a division of the BULLETIN devoted to Company Sections. The editors get whatever news they can and publish it as a matter of information, and it has occurred to me if we had a committee appointed by the Executive Committee of the Association, we would in that way get a formal recognition of this movement, which would give us better standing than if we get together informally at each convention.

The Company Sections are spending I should say, on a rough guess, an aggregate of at least $100,000 a year on educational, recreational and welfare work. Now that is enough of an investment to warrant recognition, and therefore we should have some part in the organization of the Association and in the annual Proceedings.

MR. COWLES: In other words, this committee would arrange for a conference such as this we are having here to-night?

MR. SEAMAN: And also handle any matters brought up during the course of the year.

MR. COWLES: I feel rather sore on the subject of "committees." A good many of us think that this committee movement is perhaps a little overdone, and for that reason I wish to be clear in my mind as to the scope and action of this proposed committee.

MR. FOREST J. ARNOLD, Chicago: I think we should have a committee whose membership would be distributed around the country so that one committeeman could probably arrange to represent the work of several Sections, going into details and sending the information to the chairman of the committee, or some central body for redistribution.

CHAIRMAN EDKINS: We haven't so many Sections, and we should have a member from each Company Section.

MR. ARNOLD: That would make a committee of thirty-eight or forty.

MR. A. A. DION, Ottawa, Ont.: There is need of someone to foster this movement among the smaller companies. I represent the Section in the city of Ottawa, Canada, a town of 100,000 population. We had a Section there, but it languished and we now have only twenty-five members. There are other places where Company Sections might be established, but it does not seem to be anybody's business to go into these and stir things up. Mr. Martin, our Secretary, came north last year, and we went around a little, and that did a lot of good. It seems to me that this proposed committee is a good idea because it will then be somebody's business to look after the several Sections.

If I were a member of this committee I would publish the section idea throughout my district and give it some publicity. I think the BULLETIN of the National Association should be used to a greater extent along the lines you have suggested. A committee of this kind might help the work very much.

MR. A. L. ATMORE, Philadelphia: The diagram showing the growth in N. E. L. A. membership, reproduced on page 240 of the Convention Number of *Current News*, is a striking illustration of the importance of the Company Sections. On referring to this diagram you will note that in 1908 the membership of the Association was about 1300, in 1909 it was 3100, and in 1914, approximately 14,000. This rapid growth, as shown by the sharply ascending curve on the diagram, was unquestionably due to the formation of Company Sections, and personally, I feel that a Committee such as has been mentioned here tonight would be of great value to the Company Sections individually, and to the Association as a whole.

At present we have 43 Company Sections, each exclusively under the direction of its local officers. These Sections map out programs to suit their local conditions, and I think that the creation of such a committee might tend to a greater degree of uniformity in managing their affairs. Such a committee could begin by considering the programs followed out each year by the various Company Sections, and from the aggregate perhaps find a solution to many of the problems with which it at present has to deal.

In our Section we have four branches, one in the Meter Department, one in the Accounting Department, one in the Commercial Department and one in the Engineering Department.

These branches are vigorous and active, but not to the detriment of the work of the Section, nor do they detract from the attendance at the Section meetings, which are devoted to the discussion of topics of general interest, the speakers being men of national and international reputation. At the meetings of the branches topics are discussed pertaining to the work of each individual branch, and members of the various branches are invited to attend all of the meetings. In this way they have the opportunity of becoming acquainted with the methods in vogue and progress being made in the other departments of the company. As this plan has worked out very satisfactorily in our Section, it might perhaps be made of practical value in others.

The Engineering Department Branch, of which I have the honor to be Chairman, inaugurated a special feature in its work during the past year, and visited a number of our larger generating stations and industrial plants and points of interest in and about Philadelphia. Among the places visited were the United States Navy Yard at League Island and Lubin's motion picture plant. I think the other members of the Philadelphia Section will bear me out in stating that this proved to be a very popular feature of the Section work, and could no doubt be adopted successfully by other Sections.

If we had more time at our disposal, I should be very glad to hear from some of the visiting Section Chairmen, as to the programs followed in their respective Sections during the past year. If a Company Section Committee is to be formed, immediate steps should be taken to bring the matter to the attention of the officers and Executive Committee of the Association, so that the new committee, if approved, could get down to a working basis as soon as possible.

CHAIRMAN EDKINS: I think it would probably be rather difficult, owing to the short time we have tonight, to go into any extended discussion, or detail of methods that have been pursued in the various Sections, either as to organization or to program. What we really want to decide is whether it is worth while to ask for the formation of such a committee; and secondly, if it be considered worth while, to just what extent the work of the committee should be carried; that is, whether it would act in an advisory capacity, or whether it would go even further and perhaps co-operate with the Secretary of the Association in editing the section of the BULLETIN devoted to Company Section news. It has just been pointed out that the tremendous increase in the membership of the Association in the last few years has been due almost entirely to the growth of the company section, and personally I do not think that that phase of it receives sufficient attention in our annual meetings.

MR. SEAMAN: I think this committee ought to foster the Company Sections and the conference at our conventions each year, and also do what it can to exchange ideas. It seems to me that this is about the work needed.

MR. F. A. COFFIN, Milwaukee: I am from the Milwaukee Section. During the past year our Section has just about trebled in membership. I think it is necessary for us to devise continually new methods and new ways of conducting our meetings, in order to maintain the interest and keep our members satisfied and enthusiastic in the work. We have longed a number of times this year to get in touch with the men in other Sections who were actually planning and conducting the meetings. We can get information along some lines, of course, by writing to the general secretary, but his information regarding the monthly meetings of the local Sections is more or less general. Many times during the past year I would have given a great deal to be able to compare notes with men in other Sections who had gone through the experience in local Section work that we were going through. I believe that the time has come when some of the best thought and study of the men in the Association will have to be devoted to the work of the local Sections. These local Sections are the foundation of the Association and upon their success and progress depends the progress of the Association.

I do not believe in "mushroom" growth in a local Section. The interest and enthusiasm in the work of some sections seem to follow somewhat the sine-curve. I believe that it is far better to maintain a steady growth than to carry out a "boom" and then experience a decline. It is certainly true that if a certain standard is not advanced or at least maintained, the interest and enthusiasm in Section work will decline. The members will drop out and it will be a difficult task to get them back.

I believe this committee should be a headquarters for the general exchange of ideas regarding the conduct of the work and meetings of local Sections and that a properly arranged conference at these conventions for chairmen and officers of local Sections should certainly be held.

CHAIRMAN EDKINS: I do not think the committee would accomplish very much unless it were a working committee that could be kept active during the year by frequent exchange of ideas, experiences and methods, not only with reference to forms of entertainment, etc., but to the more important questions involved—for instance, whether you should have an annual budget, whether you should pay anything or whether the entire expense should be borne by the company. These are matters on which the success of a newly established Section may hang, and a little information as to the experience of other Sections would be of great value.

MR. C. E. WHITE, Brooklyn: Coming from Brooklyn which has probably one of the oldest Sections, I might say that we are heartily in accord with the idea of having such a committee. We find it mighty hard, after having gone through five or six years, to get new ideas and to hold the interest of our members. We had better get together and give something fresh to the new men coming in, something that has been done elsewhere. I think if we could get the ideas of other Sections we could plan more efficient ways of drawing the men together, and it certainly would help us out, because we are up against it now to find new ways of getting the fellows together.

CHAIRMAN EDKINS: It probably is the experience of most of the members present that the biggest difficulty is in getting a satisfactory attendance at the meetings; I think that point alone would justify the formation of some sort of organization or committee for the purpose of studying the best methods of getting the value of our money. We are spending a lot of money every year on this sectional work, which is, in a broad way of speaking, welfare work. We certainly ought to follow it up just a few steps further, and endeavor to formulate practical methods not only of getting our money's worth from the company point of view but of seeing that the employees or members receive an adequate equivalent for the time they spend in attending these meetings.

I know that in one or two Sections, the members, while they are not forced to join, feel that the pressure is pretty strong, and there is considerable dissatisfaction. They feel that they have to join for the sake of policy rather than because they want to. I think that sort of thing is eventually going to result in a very serious slump in the membership of the Association.

MR. DION: Do you know whether there is any company that is offering inducements in the way of rebates for faithful attendance? Last year in our city there were industrial classes carried on in the evening (not in connection with our business) and the scheme was adopted of charging a fee, as an evidence of earnestness on the part of the applicant. This fee was remitted, in whole, at the end of the season, if the student had attended 85 per cent of the lessons. Now I am wondering if any of our companies have ever offered similar inducements.

For instance, you send five dollars to the National Association, and you charge your members an additional fee for local expenses, I take it. That is what we do. Now, would it be advisable to make a reduction to the members who attended all of the meetings, or say 90 per cent of the meetings, throughout the season? It is a small matter, but you know that the cash consideration is sometimes a very strong one.

Chairman Edkins: That sounds like a very good suggestion. What experience have you had, Mr. Cowles, in your company with reference to attendance. Do you have very much trouble?

Mr. Cowles: I am sorry to say that I cannot report a very enthusiastic Section in the Boston Edison Company. There are several reasons for it. We have our Geographical Section, and from the remarks that have been made, I am not quite clear in my mind just where the lines are drawn between the Geographical Section and the Company Section. We have our Geographical Section, which is active and very progressive, with two quite elaborately arranged meetings in the form of conventions, every year.

Chairman Edkins: That is the New England Section?

Mr. Cowles: Yes, that is the New England Section.

Chairman Edkins: What we have in mind here more particularly is the local or the Company Section.

Mr. Cowles: Then we have our Company Section also, and we have had a good deal of difficulty in maintaining what seemed to be proper interest in this. The interest seems to tend two ways, toward the larger Geographical Section, as regards N. E. L. A. matters, and toward our company Club in the other direction. Our Club is a large, enthusiastic organization of considerably older standing than the Company Section, so the latter seems to be lagging. At the same time it has been maintained and with a fair degree of success, but is not what it ought to be or what we would like to have it. We are not so sure but, after all, it is about all that we can expect with the kind of interest that is shown in the two other directions.

Chairman Edkins: You can get a man to come out a certain number of times only in the course of a month and if you attempt to have more meetings the attendance falls off very rapidly. We found that to be the case in Chicago.

Mr. Cowles: Meetings, like committees have come to be something of a bore with us. Our meetings, and with the various engineering meetings and different organizations, they are pretty numerous, take a good many nights in the week, and additional meetings are not looked upon with much favor; but, as I say, there are those two very definite reasons why our Company Section is not more active.

CHAIRMAN EDKINS: What is the purpose of your company Club. What is it? Is it a social club?

MR. COWLES: It is a Club to which all our employees are automatically eligible, by virtue of being employees of the company. It is the company organ for activities of a social and educational nature and has been a great success. I think that these annual conferences would be a great help to us in determining why one section thrives and another does not.

CHAIRMAN EDKINS: And to study the reasons.

MR. COWLES: In my own mind the reasons for thriving in one case and not in another are pretty well defined. At the same time there might be a good deal brought out by this interchange of experience and suggestions which would be decidedly helpful.

MR. SEAMAN: We think in Philadelphia, that welfare work, club work and all activities of a similar nature other than strictly company business, should be under the Company Section. We have not worked out this idea, but it has been my suggestion in this year's annual report, and I understand that Mr. Arnold carried this idea out in Chicago, and that it has worked very well. I think this is the direction toward which we should tend.

MR. COWLES: You see, all of our employees are eligible to membership in the company Club.

MR. A. F. MAYERS, Philadelphia: Are there any expenses in connection with that, for members?

MR. COWLES: A nominal fee, twenty-five cents a quarter, a dollar a year.

MR. SEAMAN: We could work out a plan that would cover all of these activities and have a general fee to care for all expenses not covered by company appropriations.

MR. COWLES: But your whole body of employees is not eligible to Company Section membership.

MR. SEAMAN: Why not?

MR. ARNOLD: Mr. Chairman, I think the question of policy in the different Sections varies considerably. I believe the club to which Mr. Cowles refers is a very good thing, but if we could carry the club idea along in the Section, with the nominal fee and dues of the Section, and with the support which the company, I feel sure, is very willing to give, this proposed committee in working together and adopting fundamentals will accomplish a great deal for the large Class B membership, which represents about 85 per cent of the entire membership of the Association. The object of these Sections should be settled in our minds together with the things that we want to strive for.

Mr. E. C. Stone, Pittsburgh: Mr. Chairman, it seems to me that this discussion has brought out pretty definitely the need of the proposed committee. There are many entirely different policies in the Company Sections, and the chances are that the committee by organizing, so to speak, a standard policy, could, in a great many cases, develop the value of the Sections to a very much farther extent than it is developed at the present time. In Pittsburgh our scheme is just the same as in Philadelphia. Our section is new and we have not gone very far yet, but it is our intention to make the Company Section the organ through which we will develop all the club, welfare and relief work of our employees.

Chairman Edkins: Well, it seems to be pretty well agreed by the gentlemen present that there is some necessity for such an organization. I think we should keep it as simple as possible. I do not think we want to create the impression that we are trying to add to the difficulties of the Association by multiplying the red tape or asking for any additional committees that are not going to be useful, but we have real, substantial ground for our request, in that we and the other officials of the various Sections represent, as Mr. Arnold has just indicated, something like 85 per cent of the total membership of the Association, and represent also a very large portion of the income of the Association. It has been brought to my attention, on several occasions, by Class B members who came to the convention for the first time, that they went around to various sessions and listened to all kinds of papers, but heard very little said about the Company Sections. They thought it rather odd that there should be so little attention paid to that subject when the Company Sections are really the backbone of the Association.

I think that if we could present this aspect of the matter to the Association officials, they would be very glad to co-operate with us, and appoint such a committee as has been suggested here to-night.

Mr. White: Mr. Chairman, was there not a Section Meeting two years ago?

Chairman Edkins: There was an attempt to hold one in Seattle.

Mr. Seaman: There was one in St. Louis, too.

Chairman Edkins: We had a good one in St. Louis. They had a regular time set aside for it.

Mr. White: I wonder why that was dropped.

Chairman Edkins: I think it was dropped because of the fiasco in Seattle. There were very few people in the West apparently, who were interested in Company Section work as such. They had various organizations among the electric lighting companies out there. The Pacific Gas & Electric Company had an organization of a social nature for its employees, and in Seattle, I think they had a Stone & Webster Club, and some other organization devoted to athletics and social affairs, but they had never recognized the Company Section idea in any formal way out there. Therefore, I suppose, the local convention committee did not think very much of it, and did not make much of an effort to work up any enthusiasm for the session. We had a meeting, but at the time appointed for it some very prominent man was delivering an address in another session, and the result was that those on whom we might have counted to attend went to hear the address, and Mr. Becker, who presided at the meeting, was left in the rather embarrassing position of addressing a small number of the faithful and a large expanse of empty benches.

That probably discouraged the Association officials from arranging for another Section meeting. The initiative should come from the various presidents and secretaries of the Company Sections; then, I think, you will find that the National Association will be very willing to do anything within reason to give us all the help we can possibly desire, both in the way of space in the Bulletin and substantial encouragement through the other recognized channels of the Association, provided we go after it.

Mr. Frank A. Birch, Philadelphia: Mr. Chairman, I think we are pretty well agreed on the need of organizing such a committee as that which we are discussing. The most important point to be decided here is the manner in which this plan is to be placed before the Executive Committee of the National Association. If it appoints on this committee others than the chairmen or the secretaries of the local Company Sections, it might act prejudicially to the success of the plans we now have in mind. It might be well, I think, to cover that point in our recommendation or petition to the National Association.

CHAIRMAN EDKINS: We might specifically recommend that the members appointed on the committee be officers of the Company Sections.

MR. BIRCH: We need to meet oftener than once a year. A discussion of this sort is extremely helpful, but as has been pointed out, the time tonight is so limited that we cannot get as much out of it as we should. We should meet periodically, at least three or four times a year. How the expenses would be defrayed is a matter for later consideration; but nothing is or can be more important in the work of this Association than the appointment of this proposed committee to look after the work of the Company Sections.

CHAIRMAN EDKINS: Mr. Birch, why not appoint a committee at this meeting to draft a recommendation to the Executive Committee, and if necessary, have copies of the preliminary draft drawn up and sent out to all of the gentlemen present tonight, inviting additional suggestions from them. The copies could be returned promptly to the committee with the understanding that the latter would utilize such further suggestions as would fit in with the general tenor of the recommendation as a whole, and out of the general suggestions we could get a consensus of what the Company Sections as a whole would want. We could also empower our committee to forward the corrected or amended recommendation or petition to the officers of the National Association. We could do this without the necessity of holding another meeting in order to consider the terms of the recommendation.

Your other point, Mr. Birch, is somewhat suggestive of the conferences held by the sales managers every year. I do not know but that something of that sort could be done. At least one meeting might be held before the next convention, in order that this work may not lag and the plans we have discussed here may be carried out in greater detail.

It might be well to appoint a committee. I am in favor of small committees; I do not think we should have more than three or four people on the committee to prepare this recommendation and get it into shape for the Secretary so that it can be presented at some meeting of the Executive Committee in the near future. The committee could also consider whether a formal plan or program for the ensuing year should be worked up and perhaps discussed at some later period between now and the fall, by as many of the men representing these Sections as we can get together at some convenient place.

Quite a number of meetings are held up at Association Island every summer. It is a rather convenient point for people living in the East and the Middle West, and it might be well to get quite a number of members from this part of the country. We might not get many members from the West, but I think we could hold a worth-while conference, and work out a satisfactory and practical program.

MR. BIRCH: And then the proceedings of such a convention or conference could be transmitted to the other members?

MR. ARNOLD: What motion are we speaking of?

CHAIRMAN EDKINS: We are speaking to a motion made by Mr. Seaman, that we request the appointment of a committee such as has been discussed here. If there is no further discussion, I will put the question.

The motion before the house is that we request the Executive Committee to appoint a committee. That was your motion, was it not, Mr. Seaman?

MR. SEAMAN: And that we recommend that a conference be held at each of the conventions, and also that this committee be active throughout the year in the interchange of information among the Company Sections.

(Motion seconded and unanimously carried.)

MR. C. W. BUGGY, Reading, Pa.: I should like to inquire whether this committee will immediately become active. The reason I ask this is that we have over 70 Section members, with an average attendance of about twenty-five members a month. I have reason to believe that at the end of the year quite a number of these men are going to drop out. We as a Section are right up against the very proposition we have been talking about, and if the proposed committee could immediately become active, I can see a way in which we can boost up our membership instead of letting it go down, and really passing out as a Section.

CHAIRMAN EDKINS: Well, of course the committee will be expected to get busy as soon as it is appointed by the Executive Committee.

Mr. Buggy: Then, say we have a meeting once a year, would you defer it until perhaps December of each year? It would then be too late for us to do anything.

Mr. Arnold: I move that we appoint a committee, the chairman of this meeting to be its chairman, to immediately formulate the recommendation to the Executive Committee of the Association.

(Motion seconded and carried).

Chairman Edkins: If the gentlemen present have no objection, I would like to give a little thought to the appointment of the committee. I do not want to name it offhand. I want to get a committee that will work on this thing right away and keep on it, and I will defer the appointment until tomorrow or perhaps the next day. I want to give it a little personal attention. We can not expect to take any action at this convention.

Mr. Dion: Could not a draft resolution be prepared at this convention? We could then circulate it while we have the other members of the committee with us.

Chairman Edkins: I would be very glad to have that done if I thought we could give it the right attention. I know that personally I am going to be busy the next two days and I shall have to leave Thursday night or Friday morning.

Mr. Dion: What I have in mind in urging this is that it will take considerable time to bring the thing to a focus.

Chairman Edkins: I think that is a very good point and if it is possible to bring the committee together during the week here, we will do it and get these resolutions drawn up and an agreement upon them.

Mr. Arnold: I would like to suggest to Mr. Buggy that if Chicago experience can be of any assistance to him, we shall be glad to go over the work for the past year or two with him.

Mr. Coffin: I was thinking a minute ago of asking for some immediate action on this, if the officers of each Section can get a list of the officers of the other Sections. We could get it from the record, I think.

Mr. David C. Bruce, Baltimore: Mr. Chairman, I concur heartily in Mr. Seaman's remarks. For each of us as Company Section officers to know what our member Sections are doing would be, I am sure, a great help and a decided impetus to our work.

There can be no question as to the valuable help we may be to each other if we can have a closer interchange of notes relating of our experience. The matter of organization, of benefit to employees, attendance, collection of dues, lapsing of membership, new membership, winter and summer entertainments, securing of outside speakers, question box, appointment of competent committees—all are units of importance in helping to bring about successful results.

I therefore trust that the Executive Committee will take some action toward the appointment of a standing committee to confer on these matters and put our recommendations in concrete shape. Such data may not only be of help to our present Section officers but undoubtedly will be of great value to the men of other companies who right now may be seriously considering the question of organizing a Company Section. All the help Baltimore can extend toward this end will be cheerfully given.

In Baltimore we have a very healthy and successful Section. In the last six years we have passed through a stage of doubt, trial and experiment to arrive at the right method of operation, and we have resorted to all manner of ideas, schemes and plans to keep the Association in the front ranks.

MR. ATMORE: May I ask which one of the N. E. L. A. committees has to do with Company Sections?

CHAIRMAN EDKINS: Mr. Arnold, have you bumped into any committee that has done anything for your Company Section during the last year?

MR. ARNOLD: I have not.

MR. ATMORE: The reason I raised the point was that I though the Committee on Organization of the Industry had something to do about the Sections.

MR. SEAMAN: It had more to do with the Geographical Sections than anything else.

CHAIRMAN EDKINS: The principal outside assistance that we have received, and it has been very good, was the visits of Mr. Freeman, Mr. Martin, and perhaps one or two other prominent men who have attended meetings of our Section and given our members a new viewpoint. In that way we have been assisted very materially, but I do not know of any existing committee that has any official supervision over the local Sections.

MR. W. G. CLAYTOR, Roanoke, Va.: Some mention was made of a committee on Company Sections. An effective Lecture Bureau, under the administration of Secretary Martin was organized solely for the benefit of the Sections. I know that in our section in Virginia we have had a good deal of assistance from headquarters in the form of lectures, together with lantern slides. They have been a great help. In that connection, it would seem to me that the officials of the National Association would certainly welcome a committee of this kind, because it is going to mean a great increase in membership, and they certainly would cooperate with us. It seems to me that quite a little missionary work can be done in organizing Company Sections.

CHAIRMAN EDKINS: We certainly should work hand in hand with the Membership Committee and the Lecture Bureau. The thing that impresses me in considering this matter is the fact that all the other interests in the Association are pretty thoroughly organized, and they get a very thorough exchange of ideas and experiences. The Accounting Section, the Commercial Section, the Technical and Hydro-Electric Sections are organized, and yet here the great body of the rank and file in the Association really has no way of exchanging ideas and experiences; that is, the officers of this Section have no organized scheme, no plan for general welfare, entertainment and educational work that will secure the best results.

MR. CLAYTOR: In other words, this Committee would be a good clearing house for all the Company Sections, and it seems to me that that fact should help a great deal in the organization of the Sections.

CHAIRMAN EDKINS: Such a committee, I should say, would be the headquarters for all the literature, the posters and bulletins put out by the different Company Sections. They always get out more than they need, and they could spare fifty copies for the committee. Then when a new Section is started we could give them samples of the posters, literature and all things of that kind in the nature of publicity, and some information about the entertainments that the others get up, in order that they may have something to start such work on. There is now no method, the work is done in a haphazard way by personal appeal, and it certainly could be done much better by organized effort.

MR. F. C. HENDERSCHOTT, New York City: Mr. Chairman, I came in late tonight, and into the meeting late, also. I do not think that I have yet caught the drift of the discussion. Is there a general opinion that we want to get an interchange of ideas, that we are not operating efficiently yet? If so, I am with you.

Chairman Edkins: At this time we are all "playing in our own backyards," so to speak.

Mr. Henderschott: At the same time we are keeping up the membership of the National organization without getting any credit for it.

We have a proposition different from all of the others. We have ten allied companies in our section; in most Company Sections the organization is wholly an internal organization. It is an employee's organization and the Company Section organization combined; it is not hard under those conditions. Brooklyn gives us a good example of what can be done.

Now the thought running through my mind is how can we get together the right kind of a list of questions to ask. For instance, we had to establish sub-Sections throughout our organization and to hold separate meetings of the different companies. We have had to organize a yearly convention of our own which comes off at the Hotel Astor this month. Relatively very few of those who pay the $5 membership fee can come to the National Convention; the rest of them get it at the close of the year in Proceedings form, which is barren of any personal touch. We found it necessary to have a yearly convention of our own, following again the lead of the Brooklyn people, and we are holding our membership. We have often wondered what other companies are doing. I rose chiefly to ask a question as to how you propose to prepare this list of questions that you are to send out (to the various secretaries, I take it), for information.

Chairman Edkins: We have not got that far yet. We have adopted a resolution to the effect that we will ask the officials of the National Association to appoint a committee to bring together the various interests of the local Company Sections, to lay out a plan of campaign, and to constitute a sort of clearing house for the various Company Sections during the year; and also for permission to hold a conference at the annual convention of the Association, a conference of Company Section officials.

Another motion has also been made and carried that a committee be appointed by the chairman at this meeting, or in the next day or so, to draft this recommendation or petition and present it to the Executive Committee of the Association.

MR. HENDERSCHOTT: This recommendation that a committee be appointed?

CHAIRMAN EDKINS: Yes. A temporary committee of some of the gentlemen present will be appointed to prepare a preliminary recommendation, and it has been suggested that the preliminary draft of such petition be drawn up by the Committee on Resolutions and copies of it be sent to the gentlemen who are present here tonight.

MR. HENDERSCHOTT: I want to offer the suggestion, Mr. Chairman, that before this list of questions is sent out by the permanent committee—you want to make haste, but after all, you do not want to sacrifice efficiency to haste—it would be a good idea to have the committee inquire of all the secretaries of our Company Sections what difficulties they have had, and then ask questions to cover them; as, for instance, why do the members drop out.

CHAIRMAN EDKINS: Yes, that would be information essential to have before the permanent committee could do anything in a constructive way.

MR. HENDERSCHOTT: The thought was suggested to me by various communications that have come to me, so vague that I did not get the sense of the inquiry and when the answers were all compiled, it was found that nearly every man had his own view of what was wanted, and as a result, the information given was of no value.

CHAIRMAN EDKINS: It is necessary that questions of this sort be drawn very accurately so that there cannot be any mistake as to their meaning.

MR. BRUCE: Mr. Henderschott makes a point of the difficulties. Why should we not put in some information on the other side of the ledger, give the schemes that have been exceedingly useful, the suggestions that have helped us?

We should know about the difficulties, naturally. I have some, we all have some in our Section work, but I do not doubt that the array of experts we have now right here in our Section work could offer a very good list of items, without waiting for questions and answers, that would be well worth while for our Sections to consider and try out. We have all tried various things, as I said awhile ago, along the line of welfare, educational work, membership, dues, and down to the end of the list. But along with knowing what the difficulties are and how the other man overcomes them in Section work, we might suggest to the officers of other Sections the things that we have found helpful to us.

Mr. Henderschott: I thought that would come in on the questions also. If the questions would state the difficulties that company sections have encountered, and ask for a complete list of them, you would get what Mr. Bruce has suggested.

Mr. Arnold: I believe that if the gentlemen who are present this evening would give the Chairman a brief outline of what their obstacles have been and how they have overcome them during the last few years, making the statements very brief, and send them in to him so that he will have them when he leaves the city, probably Thursday evening, or, if they are forwarded to him in Chicago by the latter part of the week, they may assist the committee in formulating its recommendation.

Chairman Edkins: That is a very good suggestion. We are all sufficiently interested, I am sure, to take the trouble to write or dictate a few lines, giving in very brief form the points of difficulty encountered in the organization in our respective Sections, and in carrying on the work, and also the principal plans that we have developed, those which have helped us most in carrying on the work, increasing the attendance, increasing the membership, and so on.

Although we have an unusually large Section, upwards of 2000 members, and are very active all through the year, I am sure that it would not take Mr. Arnold more than a few moments to sit down and outline some of our big troubles and some of what we might call our big successes, and those are the things we are all interested in, the things that have helped boost the organization, the things that we have found difficult and have had to overcome in some way or other.

Mr. Dion: Are we not anticipating the work of the committee that is not yet appointed? These suggestions that have just been made will be material for your National Committee when it is appointed, and it is to them that this information should be transmitted. The work of the temporary committee is really only to draft the resolution stating what we want the National Association to do. When it has appointed the committee, this information should be ready for it.

MR. ARNOLD: Well, I simply made that recommendation, thinking that it might assist the committee in drafting a resolution and presenting a very substantial argument for it.

CHAIRMAN EDKINS: I do not think we shall go into any very great detail in the recommendation, because, from some talk I have had with Mr. Martin, I believe he appreciates the value of just such a committee as we have been discussing, and of the work it could do. I think we can state our case in rather general terms. Now the hour is getting late, and we all want to go to the Public Policy meeting. If there is nothing further the meeting will stand adjourned.

(Adjourned)

PUBLIC POLICY AND ANNIVERSARY SESSION

WEDNESDAY EVENING, JUNE 3

The meeting was called to order at 9 P M in the Bellevue-Stratford Ballroom.

(Prolonged applause on the entrance of Mr. Thomas A. Edison.) (See page 272)

PRESIDENT McCALL: Ladies and gentlemen: As you know, it is not Mr. Edison's custom to make any address, and he desires me to express his thanks and appreciation for this very warm welcome.

The first part of the evening's program will be devoted to the consideration and review of the Report of the Public Policy Committee.

The Public Policy Committee is composed of leading men in the industry, and, as its name implies, deals with the larger principles of the relation of the industry to the public, the Government and the employees. It has been foremost in its advocacy of Governmental regulation, and in 1907 recommended to the Association the adoption of the principle of Governmental regulation in the conduct of its business. It has also been the leader in recommending all classes of welfare work, beneficial associations, service annuity plans, savings funds, sanitation and accident prevention. It has met with great success in its work for the industry, and many questions of importance, economic and humanitarian, involving great principles in connection with property are referred to that Committee for its decision, and its counsel is usually followed. In the transaction of the detail of this work much of the success has been due to the untiring efforts and indefatigable zeal of its Chairman, Mr. Arthur Williams, whom I take great pleasure in introducing to you, and in whose charge the meeting, so far as the Public Policy Report is concerned, will be placed.

CHAIRMAN WILLIAMS: Mr. President, ladies and gentlemen: My own part in this meeting will, I am rather pleased to say, be most inconspicuous. I shall take but one moment in explaining that the Report of the Public Policy Committee, in accordance with the custom of the eight years during which the

Committee has been in existence, was presented to the Executive Committee this afternoon, and approved unanimously.

It has been our custom for several years past to ask our fellow member, Mr. Samuel Insull, to present the Report at a special meeting, such as this one. I feel greatly pleased as Chairman of the Committee and as a member of this Association, that we are able to have the report presented to you by Mr. Insull. He needs no introduction to this audience. I will simply ask him to present the Report to you at this time.

MR. SAMUEL INSULL, Chicago: Mr. Chairman, ladies and gentlemen: It has been the practice at the open meeting of the Association to read the report of the Public Policy Committee, and I will proceed to read it and to make any comments I may have to make, at the conclusion of the reading.

REPORT OF PUBLIC POLICY COMMITTEE

To the Members of the
National Electric Light Association

This is the eighth consecutive Report of the Public Policy Committee of your Association. Looking back over the reports of previous years, largely upon questions of corporation policy and general relations with the employees of the industry and the public at large, we find no reason to retract or modify any of the recommendations of the past. Rather has time proved that they indicate a wise, constructive course which may well be followed to the benefit of our members individually and our industry collectively.

During the year now closing the Committee has held several meetings. Various matters have been passed upon and such disposition made concerning them as seemed proper under the circumstances. Your Committee is appreciative of an evident and spreading effort throughout the industry to maintain the highest attainable standards of service, to safeguard the health and lives of employees, and to conduct our affairs generally in a manner to commend our industry to the public at large.

Public Service Commissions

Your Committee is gratified that so little conflict exists between its own views and those generally recorded by the various Public Service Commissions. We have held consistently that the business of supplying electrical energy from large central stations is essentially a monopoly in the best meaning of the word. If a monopoly, privately owned and operated, but occupying public property to render a public service, it must be regulated by some public authority. Any effort to establish or continue an unregulated monopoly would not be in accord with the trend of public opinion.

Monopoly in public service can only be justified on the ground that some advantages accrue therefrom to the public. Such a relation cannot be permanently or satisfactorily maintained unless it can be shown that a fair part of the benefit resulting from such monopoly goes to the people at large, who, in the last analysis, are the final arbiters of the question. That the stockholders are entitled to share in the result of an efficient, well-managed service, no one can question. But this must be a partial and not the only consideration in our efforts to continue this industry in each given territory along regulated monopoly lines.

Bearing upon this point, we quote from a recent decision of the Public Service Commission of the State of California:

> "While this theory (of natural monopoly) may be ever so sound, it does not lie in the mouth of a utility representative to urge such protection on the ground that such protection is good for its patrons, when, as a matter of fact, it does not accord to its patrons the benefits such monopoly is supposed to produce. The fact that better service and lower rates usually are attendant on competition even between natural monopolies, naturally leads to the conclusion on the part of patrons of natural monopolies that the better service and lower rates are the result of such competition. Of course such is not the fact, because however low the rate and however good the service may be under competition between two agencies where one could do the work, the rate could be lower and the service better if the one were unmolested. This, of course, is capable of mathematical demonstration, but those of us who are engaged in public utility regulation have long ago lost patience with the contention of the monopolist that his monopoly shall be protected on the ground that it affords a benefit to the public, when, as a matter of fact, it brings about and is attended by added burdens upon the public, and too often results in management oblivious to the public welfare. Life is entirely too short to be utilized in trying to make natural monopolies do what they say they can and ought to do without competition. If their own self-interest does not lead them voluntarily to do that which they should do, they cannot long expect the public to protect them when protection, instead of benefiting the public as patrons, rather subjects such patrons to abuses that do not exist under competition."

After assuring ourselves that our service is maintained at the highest standards, that every consideration and facility is accorded, through properly trained and well treated employees, to the public; after convincing ourselves that we are according to the Public Service Commissions and agencies of government of our respective localities the fullest information and co-operation, our members should endeavor to inform the public, in the various ways at their disposal, of the advantages which their presence brings to the communities in which they operate.

Within the past year new commissions have been established in the states of Pennsylvania, Indiana, Illinois, Idaho and Montana; the Public Utility Laws enacted by the Legislatures of 1913 in Maine and Colorado are still awaiting the results of referendum before taking effect. Your Committee believes that the newer Commissions are approaching their duties in a broad spirit of fairness and it is important to note the re-affirmation of the newer as well as the older Commissions, of the general principle of non-competition in the field of regulated public utility enterprises.

A number of important decisions have been rendered during the past year which, reviewed by the counsel of our New York member, Messrs Beardsley, Hemmens and Taylor, are included in the appendix attached hereto. We commend this review to our membership, particularly as bearing upon the question of unified service or a regulated monopoly, the provision of supplementary service to block lighting plants and the inclusion of business building expenditures and going values in appraisals of the properties of public utility corporations.

Importance of Fair Rates and Good Service

Generally speaking, the rates of our members upon which their bills to consumers depend are the most immediate point of contact with the public. Usually, but not always, criticism will begin here. All rate schedules should be given the widest publicity; they should never be discriminatory in their nature and they should be fairly representative of the cost of rendering the various classes of service to which they pertain.

It will be appreciated that rates are not always the cause of dissatisfaction on the part of the public. Your Committee is acquainted with localities within which, while the rates have been reasonable, serious dissatisfaction has arisen because of the unsatisfactory nature of the service, including indifference or ignorance on the part of the employees of the Company. Reasonable, simple public rate schedules, an efficient, well-trained organization, covering every feature of our members' activities, and a service of the highest standards, made available through the latest and most improved types of incandescent lamps and other apparatus, are service features to which every community is justly entitled. If our members fail in giving these, they are failing to perform their just obligations to the public, and to their stockholders.

Unified Service

One of the purposes in maintaining a regulated monopoly in the electrical industry is to secure to the public and to the corporation the inherent advantages of generating and distributing electric current on a large scale to widely diversified classes and conditions of service. The larger the scale and the wider the diversity, the greater the obtainable economies. Some of these economies depend not upon size, however great, but upon a diversity of service, and this can be obtained only where a wide variety of service can be collectively served. An example of the thought we seek to convey here is found, say, in the manufacture of ice, the charging of automobiles, or the operation of street railways; however great the aggregate of the service of any one of these classes, mere magnitude of operation cannot possibly obtain the economies which would result from their combination at a single point of generation where their natural diversity factors can be utilized to the improvement of operating economies and the better utilization of invested capital. Ice making reaches a maximum in the summer and a minimum in the winter; the charging of automobiles reaches a maximum after, and not during, the business day; the passenger on a street car line is not using his electric light at his desk or in his store, nor motive power in his shop when riding in a trolley or suburban train. Here we have three elementary illustrations which, generally speaking, show a possible utilization of capital and an improvement in operating conditions obtainable through co-operative operation, but never through segregated operation.

Our members should endeavor to combine all of the electric service of their respective communities. It is also urged that when such combination has been effected, the resultant benefits be shared not only within the industry, but to the largest practicable extent with the public.

Industrial Education

Considerably less than ten per cent of our American population secures the benefit of high, trade or training school, to say nothing of university education. This means that a vast majority of the American people pass from the elementary schools at an average of something less than the course, into our industries, with any further training or education depending upon the accident of their environment. If this country is to hold its industrial supremacy we must recognize, as many European countries have recognized, that there is no branch of industrial activity from which the trained mind can be eliminated. Specialized training must be introduced into every department of human activity. There is the same need of the trained employee in commercial as in technical fields, and throughout all of the undertakings of our membership special and general training from the elementary to the highest stages should be a continuing effort. We owe this to our employees, to our stockholders and to the public.

In different localities conditions vary. In many cities of our country there are extension courses leading into many fields of human activity. To attend these courses, however, the workers of the industry must, first of all, overcome their own inertia. Then they are forced by the circumstances of their labor to attend the available continuation schools in whatever state of mental and physical fatigue that may result from their day's work and, finally passing through these schools, they have received a general rather than a direct training which, at least in a majority of instances, is less efficient and effective as applied to the service of their immediate employers. Your Committee suggests that, wherever practicable, the so-called continuation schools, covering the various activities of our industry, be conducted by our members; that attendance be within the employers' and not the employees' time and that the courses be not only broad and general but also specific and individual, as being the most productive of the highest degree of human efficiency.

Safety and Sanitation

This movement is attaining rapid headway throughout the industrial life of the country. It is no longer confined to any particular industry. The effectiveness of education in these matters is being constantly demonstrated. Thus the Department of Labor of the National Government reports that where organized safety and sanitation departments exist, two out of three accidents are prevented. Attention to this subject should be directed first to the elimination of all possible danger spots in our plants and distributing systems, and secondly to the training of the employees of our members to be constantly alert for danger to themselves and to their fellow workers. One of our member companies finds that during the past seven years only 7.7 per cent of its accidents have occurred as the result of negligence on its own part; the other 92.3 per cent of its accidents having occurred through carelessness or negligence on the part of the person injured or that of a fellow employee or an outside agency. The result of care in these matters is further shown by the following figures:

The average number of fatalities for one thousand employees among the central stations of the Second District of the State of New York for the three years 1910 to 1912, inclusive, was 4.67; while for the central stations of the First District, which includes most of the larger central stations of the State, the corresponding figure for the years 1909 to 1911, inclusive, was 1.93. The largest central station in the latter group has averaged less than one fatality yearly for each one thousand employees over a period covering the last seven years. This would tend to show that the accident preventive measures which the larger companies have been particularly active in adopting, have borne fruit.

Several of our members have well organized Safety Departments. One has recently adopted the rule that ten per cent of its employees shall be appointed to membership upon Safety Committees for a period of six months; at the expiration of this period, another ten per cent is appointed to these Committees, and so on until within a period of five years all of the employees will have served on at least one safety committee. This is, perhaps, the most direct educational method of suggesting the duty of constant alertness and responsibility to the individual employee for his own and his fellow-workers' welfare.

Hydro-Electric Development

It is gratifying that the Legislature of the State of New York declined this year to pass the proposed measures under which the State would develop its water powers and enter into the competitive business of supplying electric current to various municipalities and directly to the public. The bills as introduced proposed that these powers should be developed at public expense; that when completed they should be controlled and operated by the Conservation Commission of the State, directly in competition with private Companies and independently of the Public Service Commissions, and that the Conservation Commission should be empowered by law to charge its losses for the first three years of operation to its capital account. The defeat of these unjust and destructive measures would indicate that matters of this kind, involving questions of good faith and the wise conduct of public affairs, may be safely left with our people and, in general, to their law-making representatives.

That latent water powers of good service value should be developed is generally conceded. This development, however, should be along constructive lines and under methods which, carefully considered, will appeal to the intelligent majority of the people. At the Fifth National Conservation Congress, held in Washington, D C, during the month of November 1913, a series of recommendations presented by the Committee on Water Power were unanimously adopted, with some of the principal features of which your Committee finds itself in accord. We subscribe unanimously to the following statement of the Congress:

> "A grant of the right to use a water power, while differing in some details, is essentially similar to a grant of any other privilege

> or franchise from the Government, State or National, and its terms, regulation and control should be guided by essentially the same principles necessary to safeguard the rights of the public and of posterity as have been found essential in the case of other classes of franchises from the Government."

We also extract from the report the following principles which the Congress recommended for the purpose of governing the granting of a privilege to use a water power belonging to the National Government. We assume that the same principles would prevail where the water powers are under the control of State Governments:

> "(a) For a definite period, sufficient to be financially attractive to investors, the privilege should be irrevocable except for cause, reviewable by the courts;
>
> "(b) Thereafter the privilege should continue subject to revocation in the absolute discretion of the Government exercised through its administrative board or officer upon giving reasonable notice and upon payment of the value of the physical property and improvements of the grantee. * * *"

The recommendations adopted by the Congress contain so many additional features of importance, with most of which, as indicated, we concur, that we append a copy of the report for the consideration of our members.

Public Ownership and Operation

One of the most serious of recent developments toward government ownership and operation is the proposal pending before Congress that the United States Government shall purchase and operate the street railway system of the City of Washington, D C. It is understood that this is but the first step toward the acquirement of all the public utilities of the City of Washington and the District of Columbia and their future operation as well as ownership by the National Government. The movement is one of most serious political and economic import. Obviously, it would be no more possible for private capital and employment to compete with the unlimited resources of the National Government in transportation or the manufacture and sale of gas or electricity, than it would be for private effort to compete with the resources of the Government in the manufacture and sale of clothing or of food or any of life's necessities, the availability of which is a matter of far greater human importance. The principle underlying the one underlies all and it is to be hoped that upon proper consideration of the matter Congress will defeat this movement. It is urged that our members get in touch with their representatives in Congress and present to them the serious political and economic consequences that are bound to follow an undertaking of this nature so essentially private in its character.

The most extreme instance of municipal ownership and operation culminating during the year is that of the municipal electric light plant in the City of Cleveland. The authorities of that City passed a resolution to the effect that the maximum price shall be three cents a kilowatt hour. Our membership will recognize that if this price prevails a very large percentage of the service will be supplied at a serious loss. It is as yet too early to speak regarding the effect of this movement, but we append hereto a memorandum issued by the Bureau of Public Service Economics, which offers the latest available information on the subject.

In the judgment of your Committee, with fair public regulation, municipal operation is bound to fail. Approximately two hundred and twenty-five plants have now been abandoned in this country. In a few instances the generating plants only have been abandoned, these municipalities buying electric energy privately generated and distributing it on conductors which they still own; but in the large majority both plants and distributing systems have been turned over to private control and operation. Your Committee is advised that various municipalities of England are beginning to awaken to the serious burdens imposed by the ownership and operation of public utilities, and that many signs abound of a general reaction against the policy of a municipality attempting to operate its public utilities. The most important recent work on this subject is that of Yves Guyot, whose book, "*Where and Why Public Ownership Has Failed,*" has attracted world-wide attention. Through the efforts of your Committee this volume has been translated into English, is now having wide circulation, and is frequently quoted by those interested in the subject. We commend its careful perusal to our membership.*

Your Committee, feeling that the public is entitled to the fullest information upon various phases of the conduct and operation of public utilities, has encouraged the organization of The Bureau of Public Service Economics. On very short notice this Bureau is prepared to make accurate and unprejudiced reports upon any Government or municipal undertaking in this country or Europe. Representatives of the Bureau recently attended a public meeting in the territory of one of our members where the action of the City of Cleveland was being advertised and advocated, with the result that the other side of the question was impressed with apparent effect upon the attention of the audience. Representatives of the Bureau have also appeared before the Congressional Committee investigating the proposed operation of the public utilities of the City of Washington, D C.

It will be understood that there is no thought of concealing the moral support behind the Bureau; what little financial support it has needed has been obtained through the activities of its individuals and the sale of various publications. We feel that, with a straight-forward statement of the purpose of the Bureau, this latter point is of merely incidental importance, as enlightened public opinion would hardly oppose even material contributions to a purpose which simply seeks to inform and place the industry in a proper light before the public.

Meter Rules

Questions have arisen during the year in various States and before their Commissions concerning proper methods and rules for the testing and installation of meters. Matters of this kind fall more properly within the scope of the Meter Committee, and we have called upon it, the Chairman of which is Mr Percy H Bartlett, of Philadelphia, who has responded readily and satisfactorily. In our opinion, questions of this kind, looking to the establishment of standard meter rules and practices, before Legislatures, Public Service Commissions and other departments of Government, should be prepared by the Meter Committee and made available for the purposes of the Association. The report of the Meter Committee we understand will cover this feature of the Committee's work during the past year.

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*The Municipal Ownership Publishing Company, 17 East 38th street, New York City. $1.50.

Industrial Insurance

Some of the larger insurance companies have either adopted or are planning to adopt policies which cover various forms of industrial insurance in employee groups. Thus a group of not less than 100 employees could be insured collectively, without physical examination, at a rate based upon the age of each. As an illustration, an employer having a general employee age of 35 years would be able to insure the lives of all of his employees at an approximate cost of $12 annually for each $1,000 of insurance. In the event of death the employee's dependents thus receive a sum sufficient to keep them from immediate want.

Likewise, group accident and sickness insurance may be obtained from some of the larger companies at group rates. For accidents the cost averages, for the equivalent of one year's salary in case of death, between one-half of one per cent and one per cent depending on the risk and also whether payment is made only in case of death or to include indemnity during period of disability and on the number of days excluded; against sickness, while depending somewhat upon the number of days to be excluded from compensation, the cost will average from one and one-half to two and one-half per cent of the payroll. Again, rates vary depending upon the hazard of the industry and the conditions under which the employees work.

In making these prices recognition is taken of the fact that the insurance is accomplished by groups from which, in the premium payment, all canvassing, agency, collection and other expenses of this nature have been eliminated in obtaining and continuing the insurance.

Employees' Savings and Investment Methods

The views of your Committee on such questions as average wages, accident compensation and service annuities, are too well known to call for repetition in the present report. There is, however, one phase of employee relationship which, with increased experience, highly commends itself to our Committee members. We refer to the provision of convenient means to accumulate savings whereby employees of our industry are aided in the purchase of their homes (the medium most generally approved being the savings and loan association) and of the securities of the companies by which they are employed.

This not only identifies them in the best sense with the interests of their employers, but makes them, even if slowly, property owners, through which they become acquainted with the responsibilities resting upon the ownership and care of property, as upon other things entering into their daily lives. The only risk that the employees should take is the natural fluctuation of the market value of the securities which they purchase. If the values rise, their own stock appreciates in value; if they fall, the stock likewise will fall. Their position is identical with that of any other investor, with the advantage that the movement of the values is more directly dependent upon their interest and efforts than would be true under ordinary conditions. We commend to our members any methods by which their employees are encouraged in the acquirement of either the homes in which they live or the established securities of the companies in which they are employed.

Respectfully submitted,

Arthur Williams, *Chairman*
Nicholas F Brady
Everett W Burdett
Henry L Doherty
Charles L Edgar
W W Freeman
George H Harries
Samuel Insull
John W Lieb
Joseph B McCall
Thomas E Murray
Samuel Scovil
Charles A Stone
Herbert A Wagner

APPENDICES

A—Some Important Decisions

B—Report of the Committee on Water Power—Fifth National Conservation Congress

C—"Three-Cent Light in Cleveland"

'1—15

APPENDIX A

Some Important Decisions of the Past Year

During the past year a number of the Utility Commissions in the various States have recognized the fact that with regulation and control of public service companies by Statute, the public utilities in return are entitled to look to the State for protection from competition.

It would seem that heretofore as though this proposition had been lost sight of in a great many instances by regulating bodies and we are glad to note that the Commissions and the courts are beginning to realize the fact that if regulation as to rates and service and capitalization are to be imposed upon utility corporations, they in return must receive something from the State by way of protection. If monopolies are fostered by regulative laws, they must be protected from competition. It does not seem to be reasonable to limit the profit to be earned by a public utility and still permit it to be harassed by a competitor. The theory of protection seems to be spreading with the theory of regulation. It is hardly necessary for us to direct attention to all of the decisions during the past year in which these principles have been recognized and reiterated.

Some of the most important of these decisions, however, are:

Oro Electric Corporation, California Commission, Aug. 15th. 1913
Hawkes Electric Company vs City of Goshen, Indiana Commission, Sept. 8th 1913
Oconto Electric Company, Wisconsin Commission, Sept. 27th 1913
Gustad and W. H. Hill, Idaho Public Utilities Commission, Nov. 12th 1913
Etrick Telephone Company, Wisconsin Railroad Commission, Oct. 17th 1913
Hudson Water Company, New Hampshire Commission, July 14th 1913
Swan Creek Electric Company, Idaho Public Utilities Commission, Dec. 15th 1913
Philipsburgh's Light, Heat & Power Company, New Jersey Board of Public Utilities Commission, Feb. 3rd 1913
Owen Telephone Company, Wisconsin Railroad Commission, Jan. 13th 1914

Macon Railway & Light Company, Georgia Railroad Commission, Feb. 24th 1914
Sheboygan Railway & Electric Company, Wisconsin Railroad Commission, March 27th 1914
Eastern Telephone & Telegraph Company, Decision of Supreme Court of New Jersey, Feb. 25th 1914

The policy outlined in the above cases has been advocated for many years past by the Public Policy Committee of this Association and it is gratifying to note that the work is bearing fruit.

Two interesting decisions have been rendered by the Public Service Commission of the First District, State of New York, involving the right of private or block plant competing with the Edison Company to demand service. These decisions seem to your Committee to be of considerable importance and value to the industry.

In the case of Frankel Brothers against The New York Edison Company, the complainants owned a building on 32nd Street, in which was located a private plant. In the rear of their building was another private building, the Phipps Tenements, formerly a customer of the Edison Company, to which Frankel Brothers supplied current from their private plant at a lesser rate than that charged by The New York Edison Company. Frankel Brothers contracted with The New York Edison Company for a breakdown service and when it was discovered that they were delivering current to the Phipps' Tenements in the rear of their building, the Edison Company notified them that they were violating the provisions of the contract and unless they ceased serving the Phipps' Tenements with current the Edison Company would discontinue its breakdown service to Frankel Brothers. Frankel Brothers refused, maintaining that the Edison Company must continue its service although they, Frankel Brothers, were competing with the Edison Company and reselling the Edison current. The service was therefore discontinued and the complainants instituted a proceeding before the Public Service Commission to compel the Edison Company to continue the service. The Commission, however, held that The New York Edison Company was not bound to supply emergency or auxiliary service to a competitor. That Frankel Brothers were competitors of The New York Edison Company and were operating a private plant and selling current to the owners of the building in the rear of their building and were attempting to use the service of The New York Edison Company during certain hours of the day, so that they would be able to serve their customers without loss.

The Commission stated as follows:

> "We think it is obvious that it would not be reasonable or proper that one supply company be required to furnish stand-by service to another and to take over temporarily the duty of supplying its customers, particularly when such company would find it inconvenient or even expensive to supply them. When applied to two large companies serving the same area and competing for supremacy, the unreasonableness of the suggestion becomes apparent."

The Complaint was therefore dismissed.

The other case is somewhat similar to the Frankel case. It was brought before the Public Service Commission by Perceval, a corporation, to compel the Edison Company to deliver to it electricity for light and power on the theory that the building occupied by it was situated within 100 feet of the Edison Company's mains, and therefore under the Statute the supply company was obligated to render the required service notwithstanding the fact that Perceval was taking his electric supply for the day from a competitor of the Edison Company. The facts were that Perceval owned the building on leased ground and purchased electric current to operate his entire building during the day time from Wing, who owned the building adjacent to Perceval's, also on leased ground, in which was operated a private electric plant. The Company objected to furnishing current because the form of the contract submitted by Perceval to the Company had been mutilated. The provisions eliminated were that "no electric service should be introduced in the building or used in connection with the equipment supplied hereunder without the previous written consent of The New York Edison Company."

The Company also refused to render the service because Perceval had chosen the source of his supply from Wing who was under the Statute a public service corporation in view of the fact *that he sold current outside of his own building* and that therefore the Edison Company could not be compelled under the circumstances to furnish current to the customer of a competitor or to supplement his supply. Under the circumstances Perceval was not one of the "Public" entitled to service from the Edison Company. Perceval could get all his supply from Wing but Wing wished to throw the expense of night service on the Edison Company.

The Commission said:

> "It is obvious that a public service corporation is obligated to supply under normal conditions every person who demands service and obtains the same kind of service from no other source. It is clear that one public service corporation may not reasonably be required to furnish breakdown service for a competitor furnishing the same kind of service in the same area. Between these two extremes there are many cases involving peculiar conditions and at some point a line of demarcation must be drawn. Upon one side of it are the cases where the company is not required to supply. Upon the other are cases where the company is required to supply. Obviously, the cases close to the border line upon one side will not differ greatly from those on the other side of the line, but there must be some point of transition, and in our opinion the line is crossed when a consumer undertakes to supply adjoining properties, selling his current to other than his own tenants and where a consumer demands the privilege of switching his installation, or any part of it, from one source of supply to another, both of which are located outside of his own premises."

The complaint was therefore dismissed.

Other important and interesting cases affecting public utilities have been decided by the Courts during the past year.

The decision of the Court of Appeals of the State of New York in the Kings County Lighting Company case, which was handed down by that Court on March 25th 1914 modifying the decision of the Appellate Division. As far as the Courts of the State of New York are concerned, this decision is conclusive. The following are some of the questions decided:

1. That a public utility corporation is entitled to a fair return on its investment on the value of the property used by it, *treating a reasonably necessary and proper outlay in building up*

the business as an investment, and this amount must be considered in determining, a fair rate of return to be charged.

2. "Going Value" is an element which is required to be determined as a distinct item from good-will in making an appraisement on which to compute the fair return to which the Company is entitled. "Going value" for such purposes is an amount equal to the deficiency of net earnings below a fair return on actual investment due solely to the time and expenditures reasonably necessary and proper to the development of the business and property to its present stage and does not apply to the value of physical property.

3. The Court disagreed with the Appellate Division (141 N Y Supp., 677) and found that the Company was not entitled to an allowance for the cost of restoring pavements subsequently laid on the theory that that cost would have to be incurred if the mains were to be laid at the present time, thus dissenting from the decision of the U S Supreme Court in the case of the Consolidated Gas Company, 157 Fed. Rep., 849; 212 U S, 19. The Commission had refused to consider this item. The Court of Appeals, however, did not hold that the cost of restoring pavements could not be considered in determining the cost of reproduction in all cases, but on the facts in this case it refused to follow the decision of the U S Supreme Court in the Consolidated Gas case.

4. The Court also held that the annual increase in the value of land is not income and cannot be considered as gross receipts of the Company's yearly operations.

The Public Service Commission decided that the Company was not entitled to any amount in the valuation of its assets for "going value." The Appellate Division and the Court of Appeals held otherwise. The result will be that a large sum representing "going value" will be added to the amount upon which the rate is to be calculated.

The Commission also included in its calculation of income an item representing the annual increase in the value of the land owned by the Company and used by it in its business. This item amounted to $35,000. Both of the Appellate Courts held that this annual increase in land values was not income and that the inclusion thereof in income was erroneous.

The proceeding has been remitted to the Public Service Commission of the First District for further action in accordance with the Opinion.

Another well established principle which has been reiterated by the courts during the past year and which to a certain extent affects the large wholesale business of electric supply companies is that relating to the resale of merchandise. In several cases involving the resale of copy-righted and patented articles our highest courts have held that an agreement as to resale of the particular articles was monopolistic in character and in violation of the terms of the anti-Sherman Trust Act of July 2nd 1890.

This ruling applies not only to the sales of patented and copyrighted articles, but also to all other merchandise.

177 N Y,	473;
231 U S,	84;
209 Fed.	1007;
202 Fed.	225;
210 U S,	339.

These decisions are of considerable importance to electric companies in cases where current is sold in bulk to a customer who may dispose of it as he sees fit.

The supply company has no control whatever over a customer when once the electric current has been delivered to him.

He may dispose of it as he sees fit as to price and manner and method without restriction, provided he does so in his own building or within the confines of the block where the electric current is delivered to him.

APPENDIX B

Fifth
National Conservation
Congress

Committee on Water Power

Unanimous Recommendations
of the Committee

November 18, 19 and 20, 1913

Washington D C

To the Fifth National Conservation Congress:

The Committee on Water Power, while finding a difference of opinion among its members as to certain details of the subject feels very strongly the importance of making clear the general principles which control it and realizes keenly the consequences which would follow a failure to agree upon a constructive program of progress. It has, therefore, framed the following brief statement of the recommendations upon which it is unanimous.

A grant of the right to use a water power, while differing in some details is essentially similar to a grant of any other privilege or franchise from the Government, state or National, and its terms, regulation and control should be guided by essentially the same principles necessary to safeguard the rights of the public and of posterity as have been found essential in the case of other classes of franchises from the Government. Particularly is this true in view of the fact that a water power being perpetual will surely tend to increase in value as other sources of power, such as coal and oil, become exhausted. At the same time, for the very purpose of preserving our other power resources which are capable of exhaustion, the development of water power, under proper safeguards of the public interest should be earnestly encouraged and hastened. We recommend that the following principles should govern the granting of a privilege to use a water power:

(a) For a definite period, sufficient to be financially attractive to investors, the privilege should be irrevocable except for cause, reviewable by the courts;

(b) Thereafter the privilege should continue subject to revocation in the absolute discretion of the Government exercised through its administrative board or officer upon giving reasonable notice and upon payment of the value of the physical property and improvements of the grantee as below provided under (h).

(c) After the expiration of the period provided for in (a) above, at recurring intervals of not more than ten years the amount of compensation to be paid to the Government for the privilege and all the terms and conditions of the grant during the next succeeding period of not more than ten years shall automatically come up for determination by the granting officer of the Government.

(d) The privilege shall be unassignable except with the approval of the Government in order to safeguard the interests of the Government against speculation in water powers and against appropriation without prompt development.

(e) The privilege shall be granted only on condition of development of the whole capacity of the power site as rapidly as the granting officer may from time to time require, giving due consideration to reasonable market demands and conditions and also on condition of continuous operation, subject to such demands and conditions.

(f) The right to receive compensation for the value of the privilege varying according to the proper conditions of each case shall be reserved to the Government, State or Federal, from whom the privilege comes. We believe that the reservation of such a right to compensation is a vital essential towards the end of proper regulation. It is not sufficient to trust that the public will always receive its proper share by means of regulation of rates alone. Local authorities may neglect or may be unable, under conflict of jurisdiction, or for other reasons, to exact in the interest of the public the full value of the public's right. The value of a water power may in the course of time increase far beyond the power of local regulation to adequately distribute its benefits. At the same time, the method of exacting compensation must be carefully safeguarded so that in case full compensation by rate regulation is exacted by local authorities, an additional burden shall not be imposed. We believe that in normal cases the best method is for the Government to share increasingly in the net profits of the enterprise, provided, those profits exceed a certain reasonable percentage, the right of the Government being recognized otherwise merely by the imposition of a small annual fee or its equivalent.

(g) The Government shall have the right to prescribe uniform methods of accounting for the grantee and to inspect its books and records.

(h) Upon revocation of a privilege by the Government the grantee shall be paid a compensation equivalent to the fair valuation of its property, exclusive of franchise and consequental damages; this compensation shall include such appurtenances as are necessary for the operation of the water power and the transmission of electricity therefrom but shall not include such properties as railroads, lighting systems, factories, etc., which are of themselves separate industries.

In such transfer all contracts for the sale or delivery of power made in good faith previous to such notice of transfer should be assumed by the transferee so that the said grantee may operate and maintain the power business during his occupancy of the property under such stable guarantees as may beget confidence therein by prospective long term contractors, provided, that the Government or said transferee shall not assume any contracts made at a price or under conditions which shall be determined by the proper administrative officer of the Government to be unreasonable or confiscatory.

George F. Swain, *Chairman*
Gifford Pinchot
Hon. Henry L. Stimson
Lewis B. Stillwell
Charles R. Van Hise
M. O. Leighton
E. S. Webster
B. M. Hall

APPENDIX C

Three-Cent Light in Cleveland

By H W WILSON

Electric current for residence lighting has never been sold in Cleveland for three cents per unit, either by the municipality or by the private company.

The present residence rates of the private company average 6.4 cents per unit; the rates of the municipal plant are approximately the same. No lower rate has ever obtained in Cleveland.

On March 9, 1914, the Cleveland City Council passed an ordinance declaring that "from and after the time at which this ordinance shall legally take effect, charge for electric light shall not exceed three cents per kilowatt hour."

This ordinance will be in effect 40 days after its passage, or about April 19, 1914. Under the State laws, the private companies affected by this ordinance have the right to appeal to the State Public Service Commission. The Commission has authority to determine whether or not the three-cent rate is reasonable and, if found to be unreasonable, to fix a new rate.

The City Board of Control has adopted a resolution providing that from and after May 1, 1914, the rates for electric light supplied by the municipal plants, shall be three cents per kilowatt hour.

Neither the ordinance nor the resolution above referred to is in effect at this time, so the fact remains that three-cent electric light is still an untried experiment in Cleveland. If the private companies do not appeal to the State Public Service Commission, and if the City Board of Control does not rescind its resolution, the three-cent rate will be in effect about May 1. Whether it can be successfully maintained—if it becomes effective at that time—cannot be foretold. However, some light on the subject may be obtained from an examination of the history of Cleveland's municipal light operations during the past eight years.

History of Brooklyn Plant

Early in 1906, through the annexation of the village of South Brooklyn, Cleveland acquired a small electric plant constructed with the proceeds of a $30,000 bond issue. Except during the years 1910-11, the officials now in office have for the most part been continuously in power since the light plant was acquired. They have at all times given special attention to the Brooklyn plant, with the idea of having it make a showing sufficiently good to warrant the extension of municipal lighting activities by the city.

Immediately after its acquirement, the village generating plant was abandoned and a new generating station was built in the neighborhood of the old one, but in a much more advantageous operating location. In building and extending this plant, money was taken from funds raised by taxation, as follows:

1906	$98,752.75
1907	58,536.00
1908	69,377.00
1909	50,000.00
Total from taxation	$276,665.75
Bonded debt assumed by city	30,000.00
Taxpayers' direct investment	$306,665.75

It has always been extremely difficult to obtain reliable data concerning the operation of the municipal plant. An audit of the first three years of operation was made by the State Bureau of Inspection of Public Offices. This is the only disinterested official audit which has ever been given to the public. Annual reports are usually made by the city authorities, but not in sufficient detail to determine even approximately the cost per unit for manufacturing and distributing electric light; nor is there any available data to determine the actual present value of the plant.

The rates charged by the municipal plant, although computed in a different manner, have always been approximately the same as those charged by the private company. *At no time has the city made a rate which would average lower than the private rate.* Since 1907 the street lighting furnished by the municipal plant has been paid for out of the street lighting fund, entirely independent of the amounts given above, at the same rate per lamp as was paid to the private company.

Up to the present time, therefore, neither consumers nor taxpayers have derived any financial benefit in the way of reduced rates from their investment of $306,665.75.

No interest has ever been paid on this investment and no sinking fund has been set aside to provide for its return to the taxpayers. Commenting on this, the state auditor in the official audit above referred to said:

> "It will be seen at once that the method pursued has been equivalent to the issuing of bonds for the extension of the lighting system to the amount approximately of $100,000; $60,000 and $70,000 for each of the three years (1906-7-8), respectively. But in this manner of procedure, no interest need be paid and no sinking fund provided for. *Thus the taxpayer is obliged to pay for his light and also to carry the burden of the plant in taxes. The unfairness is apparent and adds materially to the cost of lighting.*

The total thus "added to the cost of lighting" amounts to a very considerable sum.

It is customary for the city authorities in making their annual reports to set up certain charges against the revenues of the plant for depreciation, interest, lost taxes, etc.; *but these are bookkeeping charges only, and no actual money has ever been returned to the general city funds from whence the original investment was taken.* All the revenues above the actual cost of operation derived from the sale of electricity—including that derived from street lighting—have been absorbed by the plant; so that the actual cost to the taxpayers on January 1, 1914, was approximately as follows:

From taxation	$276,665.75
From bonds	30,000.00
From interest on investment at 5%	88,226.37
From lost taxes (on basis paid by private company)	50,600.40
Total	$445,492.52
Deduct for street lights furnished in 1906	9,445.28
Taxpayers' total investment	$436,047.24

Against this taxpayers' investment the city may fairly be credited with the present value of the plant. No general appraisal of the Brooklyn plant has been made in recent years, but the book value, as recently given by Superintendent Ballard and Director of Public Service Springborn, is $386,702.20. If this *book value* is accepted as the *actual value,* the loss to the taxpayers by reason of the municipal ownership of the Brooklyn electric light plant is the difference between $436,047.24 and $386,702.20, or $49,345.04. *In other words, consumers of municipal electric light have paid a rate which has never been lower than the private company's rate and which averages around seven cents per kilowatt hour, while the taxpayers at large have suffered a loss of at least* $49,345.04 *of their investment in the Brooklyn municipal light plant.*

But this by no means represents the total losses sustained by the taxpayers. The municipal plant pays nothing for services furnished by other city departments, although required by state laws to do so. It pays nothing toward the support of the treasury, auditing, engineering or legal departments, although constantly using their services. Damage claims arising from accidents have never been paid out of the revenues of the plant. Thousands of dollars' worth of water have been furnished free by the water-works department, thus compelling water rate payers to pay a part of the light bills of consumers of municipal electric light.

New Plant Authorized

In 1910 a change of administration brought about a change of policy for the municipal light plant. Money was no longer appropriated from funds raised by taxation and the policy was adopted of forcing the lighting plant to live within its own income. In 1912, however, the former officials were returned to power, and at the same election a bond issue of $2,000,000 was authorized for the purpose of building a new lighting plant. While no money has been appropriated from taxes during this administration, large sums have been taken from water-works funds for municipal electric light purposes. No figures are available showing the total amount taken from the funds of the water users for the benefit of municipal electric light consumers, but it is known that $35,000 was appropriated from the water fund for the purchase and installation of electric light machinery; that land valued at $141,000 was seized from the water department for the new light station; that approximately $40,000 used to build the water tunnel for the new light plant was taken from the water fund. An attempt has just been made to make public the full extent of the diversion of water-works money and property to the electric light and other projects by means of a council investigation of the water department; but the attempt was defeated by the city administration. The money owing to the water department by the electric lighting, heating and other departments, is needed to pay for a new filtration plant to provide the citizens with pure water, but since it is not available a bond issue is now being floated for the filtration plant.

On the pledge that with $2,000,000 a plant could be built that would furnish the citizens of Cleveland with electric light at three cents per kilowatt hour, a bond issue for that amount was approved by the people. The original pledge called for the completion of the plant and the inauguration of three-cent light in September of last year. Later the date for completing the plant was advanced to next May. At this writing that date has also been abandoned and it is now stated that the new plant will not be able to supply customers until some indefinite date after May 1. In addition to the $2,000,000 bond issue approved by the people and to the sums taken from the water department, bonds amounting to $500,000 have been issued without the consent of the people, so that the final cost of the new plant will be at least 33% greater than the original estimate. These bonds bear 4½% interest and a sinking fund amounting to about 2½% annually will be required for their retirement. It follows, therefore, that the new plant must earn 7% above the cost of operation and maintenance, unless the taxpayers are to be burdened with the interest and sinking fund charges.

It has been definitely announced by the city administration that upon the completion of the new plant the Brooklyn plant will be abandoned and scrapped.

Attention has been called to the extreme difficulty experienced in securing any reliable figures concerning municipal lighting operations from the city administration. This is well illustrated by the following incident.

Difficulty of Obtaining Facts

F. W. Ballard is Superintendent of the municipal electric light department. During the last municipal campaign—in October, 1913—Mr. Ballard delivered an illustrated lecture on the Brooklyn plant's operations, in the course of which he said:

> "Now I am going to tell you just exactly everything that has been put into this plant. From 1906 to 1907 there was appropriated $159,000 to set up machinery for street lighting purposes. During that time there was nothing charged by the lighting plant against the city for the street lighting that was done on the streets by the arc lights. I have listed what that consisted of, and up to that time we have $89,000 worth of lighting run by the Brooklyn lighting plant, figuring the same value exactly for that lighting which the Illuminating Company was charging the city for the lighting which they did. One hundred and fifty-nine thousand dollars was appropriated. Subtracting that $89,000 from the $159,000 leaves $70,000. Of course you should add that $70,000 to the original $30,000, and that, so far as I am able to find from the accounts in the Auditor's department, and as far as any one can tell me, that is all the money that has ever been put into this plant, the original $30,000 and an additional $70,000, making $100,000 that has been put into this plant, and yet you have a plant whose value at the present time is $386,000, nearly four times that, and yet this plant has been cited as a failure."

At about the same time, Director of Public Service Springborn, in an address before the Engineers' Society of Cleveland, used the following language:

> "The present net value of the (Brooklyn) plant and equipment is $386,702.20. In addition to the original $30,000 for which bonds were issued, the city has put into the property about $70,000 from taxes in excess of the value of the service rendered in furnishing street lights during the early years of its operation."

Mr. Springborn, except during 1910-11, has been the official head of the public service department since the inception of the municipal light plant and is the one official supposed to have full, complete and exact knowledge of every detail of its affairs.

Recently Superintendent Ballard also appeared before an Engineers' Society and repeated the statements quoted above. On this occasion the accuracy of his figures was challenged, and after a second examination of the records, he admitted his error in the following communication which was printed in the Cleveland daily papers:

> "With reference to the question as to the total amount of money put into the Brooklyn Lighting Plant from bonds and taxes, would say that since the question was raised by yourself as to the accuracy of the figures shown on the screen at the Engineers' meeting on Saturday evening, I have again taken the matter up with the Accounting Department and the State Examiner, and find that we are both wrong.
>
> "In the figures originally secured by me from the same source as above, the amount secured from the general funds was evidently overlooked, and in your own statement of figures you have also overlooked the fact that all of the street lighting which was done by the Brooklyn plant up to 1909 was not credited in any way to the funds belonging to this plant. The value of the street lighting was $89,090.88.
>
> "The total value of this lighting being $89,090.88, should of course be credited to the plant, leaving the net amount to be charged against the plant of $217,574.87 that appears from the following statement:

"Total Appropriation from city	$306,665.75
"Credit for this period for street light bills which were not rendered or paid	89,090.88
"Total transfer to Brooklyn plant from city	$217,574.87

> "(Signed) F. W. BALLARD,
> *"Com. Light & Heat Div."*

The communication from which this extract is taken appeared in the Cleveland *Plain Dealer* on February 3, 1914. It will be seen that Mr. Ballard admits an error of $117,574.87, or over 117%, in his calculation of the cost to the people of their Brooklyn plant; but he claims a similar error was made by his critics in not allowing a credit of $89,090.88 for street lights furnished by the light plant in 1906-7-8-9. In this Mr. Ballard is again mistaken.

Referring again to the official audit of the State covering the first three years' operation of the Brooklyn plant, we find the following comment:

> "The lighting plant of Cleveland enjoys the unique and thoroughly proper distinction *of being paid for all current produced.*

> *The city pays the same rate to its own plant that it does under contract to private corporations, whether for domestic or street lighting.* The fairness of the practice is obvious. This should be done in every branch of the city's government, particularly in the case of public utilities, for by such method only can the success or failure of the municipal undertaking be determined."

The following table appears in the same report:

Sources of Income.

	1906	1907	1908
Taxes	$18,752.75	$58,536.00	$32,377.00
Private consumers......	6,995.43	14,071.88	20,020.50
Misc. Sales.............	19.34	372.16	128.77
Sales to other City Depts.		24,218.53	34,817.41
Interest on deposits....		1,392.69	711.33
Transfers from other funds	80,000.00		37,000.00
	$105,767.52	$98,591.26	$125,055.01

This official audit, made by the auditing department of the State of Ohio, further says that:

> "All receipts were carefully verified. The charges were established and opposed to these were set up the credits in cash, rebates and unpaid bills. The cash credits on the various ledgers *agreed in every instance with the cash book and the treasurer's receipts."*

Among these cash credits, as shown by the tables of "Receipts and Disbursements," appear the items given above as "Sales to other Departments" actually paid in cash to the credit of the lighting plant. Thus it appears that the statements made by both Director of Public Service Springborn and Commissioner of Light and Heat Ballard with reference to the cost to the people of the municipal plant, are at variance with the facts.

Brief mention may be made of the fact that in 1908 Cleveland became the owner of a second municipal lighting plant through the annexation of the village of Collingwood. This plant is officially admitted to be a financial failure, and no attempt has ever been made to extend it. A bonded debt of $40,000 which the city assumed when it took over the plant must be paid both as to interest and principal, by the taxpayers of Cleveland.

Cleveland city officials are responsible for reports which have been widely circulated, that thousands of dollars have been saved to the people of Cleveland for street lighting, through municipal competition since 1906. The fact is that the rate of reduction per annum is the same for the eight years since the city acquired the Brooklyn plant as for the preceding ten years; neither more nor less.

Summary

From the facts herein given, Cleveland's experience with municipal ownership may be briefly summed up as follows:

(1) No electric current has ever been sold for residence lighting purposes at three cents per kilowatt hour. Municipal current for lighting purposes has never been sold at a rate averaging below approximately seven cents.

(2) Municipal ownership has not affected the cost of street lights.

(3) Cleveland's modern municipal plant, built in 1906 and serving only such contiguous territory as could be served most economically, built at a direct cost to taxpayers of $306,665.75, has never paid a dollar of taxes, or a dollar of interest on the money taken from taxes; has received thousands of dollars of free service from other city departments supported by the taxpayers; has never returned to the city treasury a dollar of the money taken therefrom, and is about to be scrapped, entailing a complete loss of a large part of the investment.

(4) During eight years of municipal operation an average rate of nearly seven cents per kilowatt hour has been inadequate to cover cost of operation, maintenance and depreciation—to say nothing of interest and lost taxes. Therefore any statement that a municipal plant in Cleveland can or will be successfully operated at a three-cent rate, is a prophecy rather than a demonstrable fact.

March 28, 1914.

Mr. Insull (continuing): As I have stated on previous occasions the Public Policy Committee is composed of practically the leaders of our industry. It is probably the most important committee in connection with the working of this Association. Its enunciation of policy from year to year puts us in a position of coming before the public with a straight cut reason for our existence. The industry with which we are all connected is one of the great industrial movements of our time. Its prosperity is necessarily largely dependent upon the general prosperity of the Nation.

Statisticians get out statements to show that our industry is the particular industry that is not affected by hard times: but those of us who are in the habit of looking into our own figures know full well that the fluctuations in our income, the rise and fall of the amount of energy used by our customers is dependent upon the general condition of business throughout the territory in which each particular member company operates.

We are very fortunate in one respect, the business of manufacturing and distributing electrical energy is of but recent growth. It is a business which has not by any means reached the saturation point so far as the communities in which we operate are concerned. The older public service industries have got relatively a larger share of the possible business that they can obtain in a given community, and therefore they are apparently more sensitive, so far as their balance sheet is concerned, to the conditions of rise and fall in general business.

As I was saying, we have not, fortunately, reached that point of saturation, and the new business that we are able to obtain in any given territory, often during periods of depression, compensates us for the lessened use of our product by our old customers, and in many cases, even notwithstanding general depression, shows a percentage increase on the whole, as compared with previous years.

I am referring to this subject, and in the few minutes at my disposal it is the only subject of consequence I am going to refer to, because I want to bring home to the membership of this Association the seriousness of the effect of any legislative enactments by the National Congress that might possibly have the effect of curtailing our operations and confining our business to limited areas. Economically ours is a business the only limit of which should be the territory that can be served, irrespective of such unnatural borders as State lines or the confines of a municipality.

Those who have studied the history of legislation in this country and in Europe affecting our industry, must have been very greatly impressed by the tremendous effect for evil produced in Great Britain by the enactment of what was known as the Chamberlain Act, of I think 1884, with reference to the electric light and power business. The result of that enactment has been that the business of electrical distribution in Great Britain has received such a check that if it had occurred in this country, the chances are that instead of meeting here in our conventions by the thousands, our meetings would be in tens and twenties.

Another result has been that the British cost of energy has been greatly increased, distribution systems have been tremendously curtailed, and the entire operation of the business in large centres of population and in large districts has, with very few exceptions, been on the most limited scale possible.

As has been so often stated in our conventions, this is a business which is necessarily regulated under our system of government. We are regulated either by local municipal bodies or State Legislatures, or, where the duties of the legislatures have been delegated, by Public Service Commissions. Our business is naturally a monopoly. It is a monopoly which, as the Committee report has stated, can be more economically operated where the possible diversity of service is brought under one single producing and distributing agency.

Now, if the amendments, if the so-called improvements in the Federal anti-trust laws, are so designed as to bring our business, if of an interstate character, under Federal control, we are likely to be the sufferers, and the general development of our industry over wide areas is very likely to be much curtailed.

Notwithstanding the objection of some of the distinguished gentlemen who represent various parts of this country in the Houses of Congress, I would strongly advise our members—and in doing so I know I am voicing the opinion of the Public Policy Committee—I would strongly advise our members to get in close touch with their Federal representatives whether they be members of the House or Senate, and present to them the economics of our business. Show them that a monopoly may exist in a community to the advantage of the community, that these monopolies are regulated at the present time by almost as many State Commissions as there are States in the Union, and that anything that is done in curtailment of the most liberal interchange of energy from one State to another, the most liberal possible relationship between local properties and the large holding companies that are financing the business of producing and distributing energy over large areas, anything that is done to interfere with these relations, is not of so much consequence to the dwellers of large cities, but is of very serious consequence indeed to our rural communities, to the smaller towns in our various States. Only by the operation of such organizations is it possible to bring within the range of the rural household the same advantages, so far as cost and conditions of the product are concerned, that are enjoyed in the large centres of population.

I have been requested by the gentleman in charge of the meeting to close my remarks at a quarter of ten, as there are some other exercises to follow, and I will therefore close at this time.

PRESIDENT McCALL: Ladies and gentlemen, the remainder of the program of the evening is practically an anniversary event.

Thirty years ago there was held in Philadelphia the first International Electrical Congress, under the auspices of the Franklin Institute—in June, 1884. It has been thought proper by the National Electric Light Association to pause for a moment to dwell upon the history which has been made since that time. Among those who were active in the work of the Exhibition the fruits of whose genius were just then being placed on exhibition, were Edison, Bell, Brush, Vail, Thomson and many others, some of whom are with us tonight. These men not only dreamed dreams, but by the application of their hands and brains have accomplished things during this greatest period in the history of humanity, which will leave their impress upon all the ages to come.

Inasmuch as this great conference, the first international conference in the world devoted to electricity, was supported and held under the auspices of the Franklin Institute, it is fitting that the representatives of the Franklin Institute should take charge of that part of the meeting which deals with the event. I therefore have the pleasure of introducing to you the President of the Franklin Institute, Mr. Walton Clark of Philadelphia.

MR. WALTON CLARK, Philadelphia: Gentlemen and members of the National Electric Light Association, and ladies: With Mr. McCall's introduction this meeting becomes a meeting commemorative of the International Electrical Exhibition held in the City of Philadelphia thirty years ago under the auspices of the Franklin Institute for the promotion of the mechanical arts. The fortuitous circumstance of my being the present incumbent of the office of President of the Franklin Institute is solely responsible for my presence in the company of the distinguished scientists whom you see before you, and of my being privileged to preside over this gathering. But, however accidental my presence may be, the Franklin Institute is present, appropriately and logically, and this not alone because it was the dominant influence in the great Exhibition of 1884. Whenever and wherever the pioneers of your wonderful industry are gathered, there, if the galaxy be complete, will be the spirit of the great Franklin and the bodily presence of the Institute that bears his name. Not a man among you, in whatever branch of the great field of electric science he labors, who can trace his art back to its origin, can escape contact with this old generator, designed, built and operated by Benjamin Franklin, and few of you, following that quest, can escape passing through a certain classic building in 7th Street, the home of the Franklin Institute. For two generations before the beginning of what we may call the Electrical Age, the age that began when Mr. Edison was in his young manhood, for more than a generation before the Atlantic cable was laid, before the immortal Morse began making great canvasses and long before the dream of a girdle around the world entered into his head, the Franklin Institute was promoting the science of electricity. Recording, disseminating, illustrating, encouraging, rewarding, the Franklin Institute has given continuous service to four generations. Your industry cannot, nor can any other industry based on the mechanical art, write a complete history of its development and escape a recognition and an acknowledgment of its obligation to the Franklin Institute and the great man whose name it bears. The most important individual service rendered the electrical art by the Franklin Institute was doubtless the great exhibition of 1884 which we are commemorating tonight. In the presence of you gentlemen, wise in the science and skilled in the art of electrical generation, distribution and utilization, it would ill become me to endeavor to describe the exhibition and to speak to you of the influence which it has exerted upon your industry. There are gentlemen present who may more appropriately speak to you about it. When your industry was new—and I remember well when it was new—it demanded men of engineering and executive ability. The first speaker of the evening, amply proved during his earlier years that he had engineering ability, and his present position proves that he has organizing and executive ability. I take great pleasure in introducing to you Mr. Rice, president of the General Electric Company.

MR. E. W. RICE, JR., Schenectady, N. Y.: Ladies and gentlemen, when I was asked by your chairman to come here tonight and make a short address in commemoration of this anniversary, I hesitated. It seemed to me that thirty years, a long time in the history of our industry, was so long that I could hardly trust my memory as to the events which occurred at that remote time. I hesitated also because I had a natural reluctance to appear to be such a pioneer in the business as to have recollections of such, I may say, almost prehistoric times.

However, I consoled myself finally by thinking that I could supplement my recollections by my imagination, but even that refuge has been destroyed, as your committee has brought here as witnesses, men who were the mighty creators of our industry, men who were producing, inventing and starting this industry when I was a mere boy. Therefore I am sure that there is danger that their memories may be as accurate and as true and as remarkable as their deeds, and I shall have to confine myself, therefore, rather closely, I fear, to the facts. In the invitation which your chairman sent to me, he made some complimentary remarks to the effect that I had taken a prominent part in that exhibition. I suppose that this conclusion came from the fact that he may have found my name associated with that of Professor Thomson in connection with the exhibit of the Thomson-Houston Company, and also that my name was upon the list of the confreres of the International Conference of Electricians, which was held concurrently with the exhibition. However, at that time I was so young that I think about the only honor I can claim in connection with the conference, perhaps, is the somewhat doubtful one of being the youngest confrere. I plead however in extenuation, that I was a good boy and was properly "seen but not heard." (Laughter)

It is rather difficult, even for those who have lived through those times and down to the present, to look back and properly picture to themselves the condition of our industry at that remote period. At that time there was not a single trolley car in operation anywhere in this city or in the country, or, so far as I am aware, throughout the whole world.

The highest voltage that was used commercially at that time, and in this I will have to ask Mr. Brush to correct me in if I am wrong, was about 2000 volts. The largest current that was mentioned, and this was only mentioned by the scientists of the conference and mentioned with somewhat baited breath, as if it were something to be hoped for—the ultimate attainment—was 5000 amperes. The largest electrical generator, as I remember, was the Edison "Jumbo," which was capable of operating, I believe, 1200 16-candle power lamps. The largest engine dynamo, prime-mover, was under 200 hp, I think under 150. I am speaking now of what was at the Exhibition. This was long before the days of X-rays, of course, of automobiles and of flying machines.

I sometimes think that the gospel of work was somewhat more popular then, and that it was necessary to hustle a little more than it is today, when some people seem to get along with talking a little, and with the policy of waiting and watching. (Laughter) That, however, has not yet afflicted our industry.

My mind naturally runs to some of the stories which were circulated in those days. Of course they were childish as the industry was young. The pioneers remember them, and perhaps some of you gentlemen may remember them, but at any rate you will forgive me if I recall some of them. One that was quite popular related to the shipment of a dynamo. One of the large manufacturing concerns had shipped a dynamo to an important customer, with a letter reading: "I am shipping you a dynamo with 200 volts," and the reply came back "We have received the dynamo but where are the volts?" (Laughter) That was a companion story to the ones about receiving lamps without the currents and without the watts and a few things of that kind.

But I am rather digressing and I will try to describe briefly some of the things which we exhibited. First, I will say something about an exhibit in which I was interested, that of the

Thomson-Houston Company with which I was associated. Our principal exhibit naturally consisted of several sizes of Thomson-Houston arc dynamos, arc lamps and various fixtures which went to make up a system of arc lighting in those days. I quote as follows from the complimentary reference to our exhibition made in the General Report of the Chairman of the Committee on Exhibitions.

"No company presented a more systematic display of electric lighting machines and accessories than the Thomson-Houston Company, and it was particularly valuable from an educational point of view. The exhibit had been carefully set up in Lynn before it was brought to Philadelphia, and throughout gave evidence of the conception of a perfect organizer. Some of the instruments with mechanism dissected, illustrating the principles involved in working their machinery, and the large solenoid showing curious magnetic effects, were the source of continued study by amateurs."

The following is a rather incomplete list of some other exhibits which our Company made:

Thomson film cut-outs,
Thomson vacuum cut-outs,
Thomson lightning arrester for dynamos,
Special galvanometers for electric light circuits,
A 10-ampere arc light circuit divided into two circuits with two series of arc lamps of 5 amperes each,
One motor dynamo,
Small electric motor,
Incandescent distributors for arc light circuits,
Thomson combined motor and alternating-current dynamo.

This list is of interest as indicating the activities of one of the leading companies of those days. Motor-generators, especially direct-coupled motor-generators, were then a great novelty, and one of the two motor-generators which we exhibited was a direct-current motor coupled directly to an alternating-current generator.

Lightning arresters for the protection of electric-light circuits were, I believe, introduced into the art by Prof. Thomson and at this time were quite a novelty.

The film cut-out mentioned was the forerunner of the film cut-out which has been so universally used on series incandescent lighting circuits. The division of the 10-ampere arc light circuit into two independent series circuits of 5 amperes each was accomplished by placing in each of the 5-ampere or split circuits a large electro-magnet or reactance coil, which showed a clear recognition on the part of Prof. Thomson of the properties of reactance in an electric circuit, and was probably the first application of such a principle for such a commercial purpose. It naturally attracted a great deal of attention. It is unnecessary to state that such a division of the electric circuit would not be possible without the use of reactances or large resistances.

The electric motor was just beginning to be used commercially at the time of the Franklin Institute Exhibition. In addition to the motors which we exhibited, the Brush Company had three in operation, one running two looms, one driving a plating machine and one driving a fan for ventilating the general offices of the exhibition. Almost all the large electric companies had one or more electric motors on exhibition.

I particularly remember the exhibit of Mr. Sprague, who showed a number of electric motors arranged for constant potential circuits which gave constant speed under variable load without an automatic regulator. Some of these motors had in addition to the regular shunt winding a few series turns arranged for differential action, the effect of which was to weaken the field just enough to give constant speed under the most extreme variations of load. I remember I was very much impressed with the behavior of these motors and with the ingenuity of the method adopted by Sprague to produce a variable load. As indicating Sprague's enthusiasm and prophetic vision I would also mention that he exhibited a motor for electric railway purposes with self-contained means for varying such mechanical effects as speed and power, and means for reversing the direction of rotation. This was the year in which the two principal railways of Philadelphia, the Union and Market Street lines, were at work changing their entire systems of something like twelve miles from horse to cable cars, and it was, naturally, several years before the famous Richmond installation or Van Depoele's first electric trolley installation in Toronto.

Probably the most impressive exhibit was that given by a combination of the six companies operating at that time under Edison patents. This exhibit occupied a large space and showed the Edison incandescent lighting system, a large "Jumbo" dynamo, and what was a particularly prominent feature, a pyramid 30 feet high containing some 1200 Edison incandescent lamps which attracted great attention when lighted, as it was at regular hours.

I remember with interest that organ recitals were given at intervals upon an organ the bellows of which was driven by an electric motor and the pipes operated from a considerable distance through the medium of an electric keyboard.

A lady had just finished reading an account of the Edison display when she laid down the paper with an expression of horror and said "I see that Edison is going to put in a thirty-ton dynamo: I don't think that should be permitted." After meditating awhile the danger seemed even greater, and she exclaimed "Suppose some horrid fellow should throw a lighted cigar into this, why thirty tons of dynamite would blow up the whole city."

The United States Electric Light Company exhibited a system which was largely representative of the genius of Edward Weston. This consisted of dynamo machines for arc and incandescent lighting, arc lamps, incandescent lamps, motors, instruments, etc.

In the Brush exhibit was shown not only the well known Brush arc lighting system of dynamos, arc lamps, etc., but also the Swan incandescent lamp, and what was then a great novelty, the Brush storage battery. This was about the first bow for commercial favor of the storage battery in America.

Other well known pioneers of the early days were there, such as Van Depoele, Ball, Bernstein, Hochhausen, etc.

In addition to the exhibitors of electric light and power apparatus there was also a very interesting exhibit by the Western Electric Company of switchboards, magneto call bells, cables, telegraph and telephone apparatus. The American Bell Company had a working telephone exchange system connecting with the exhibitors and all the subscribers of the Philadelphia Exchange, and a particularly interesting historical exhibit of the first telephone, the telephone of Bell exhibited at the Centennial Exhibition, carbon transmitters of Edison and Francis Blake and the original telephone exchange switchboard.

The "Electrical World" which was then in its infancy, had the great enterprise to print its weekly edition during the exhibition on a press run by a small Daft electric motor, and claimed, doubtless with its customary accuracy, that it was the first time had any journal been regularly printed by electricity.

However, my most vivid memories of this time are not of the buildings, machinery and exhibits, but of the men, the great inventors, scientists and the pioneers of those days, many of whom have since passed away. I remember especially the meetings of the Conference of Electricians, the most commanding figure, of course, being that of Lord Kelvin, Sir William Thomson as he was then known. At these meetings I had the great pleasure of listening to such men as Sir William Preece, Sylvanus Thompson and Simon Newcomb who called the Conference to order and introduced the President of the Conference, Prof. Henry A. Rowland. I remember how thrilled I was by Rowland's opening address. Lord Kelvin, who followed, called Rowland's address "an admirable exposition of the relations between pure science and the applications of science to the wants of men."

The Conference which followed was, as I have stated, presided over by Prof. Rowland, and was participated in by Lord Kelvin, Sir William Preece, Prof. Sylvanus Thompson, Prof. John Trowbridge, Prof. George F. Barker, Prof. Wm. A. Anthony, Prof. Elihu Thomson, Prof. Simon Newcomb, Mr. Frank J. Sprague, Mr. Nathaniel S. Keith, Mr. Thos. D. Lockwood, Prof. George Forbes, Prof. E. J. Houston, Prof. Alexander Graham Bell and many others.

Its most important work was the recommendation of the recognition by Congress of the ohm, the ampere and the volt, following the Paris Conference. After this Prof. Rowland read a long paper on the theory of the dynamo electric machine, full of valuable advice; it contained information and views much in advance of the times, and was not, I fear, fully understood. However, it gave definite and rather sharp criticisms of many designs which then existed and provoked, as a consequence, a lively and at times a warm discussion by the various inventors, who felt that their pet designs or theories were attacked.

A most interesting discussion followed the recommendation by Sir William Preece of the adoption of the "watt" as the unit of power, and a further amplification of Sir William Preece's suggestion made by Prof. Cross to call one thousand watts a "kilowatt." The term "watt" was finally adopted by the Conference, but the adoption of the "kilowatt" while favorably considered was postponed.

I think the Exhibition and Conference had a wonderfully stimulating effect upon the design and manufacture of electrical measuring instruments of various kinds. The subject was most intelligently discussed by the Conference; not only was the action of the Paris Electrical Conference in establishing the ohm, volt and ampere endorsed, but there was considerable time devoted to the discussion of the necessity for improved instruments and better methods of calibration.

Sir William Preece said, in speaking of the need of greater accuracy in measuring instruments, "I tried instruments from every maker known to be fairly accurate yet I scarcely succeeded in obtaining instruments to record to an accuracy of five per cent. It was a common thing to find our ampere meters showing an error of ten per cent but the volt meters were more accurate. At the present moment I do not know of a single instrument that can be bought from an instrument maker in England that has recorded upon it a certain scale that can be relied upon to within five per cent.

Sir William Thomson speaking upon the same subject stated, "We have at present ampere and volt meters which are not good even within two or three per cent and sometimes not within ten per cent of what they profess to be. There is great difficulty in obtaining instruments which have the conditions of constancy in themselves, and when anyone has produced an instrument which has in itself the conditions of constancy it is exceedingly difficult to get the value of its coefficient determined."

The scientists and practical workers in the electrical field at the Conference all felt the need of accurate, rugged instruments which would permit the close and speedy measurement of the various electrical quantities. How well the demand was met, particularly by Edward Weston, is a matter of history. I have always believed that the electrical industry owes much of its wonderfully rapid advancement to the accuracy and quickness with which we have been able to measure the various electrical quantities. Indeed, one has only to think of the time, expense and difficulty involved in making any other measurement, particularly of a mechanical nature, such as the measurement of the power consumed by a machine or the flow of steam or water, to realize the debt which we owe to electrical instrument makers. Indeed, the easiest and most accurate method of measuring mechanical power is now indirectly by electrical means.

I may be pardoned, perhaps, for saying that one of the most pleasant recollections which I retain of the Franklin Institute Exhibition is that three of my Professors at the Central High School took such a prominent and important part in the work of the Conference and of the Exhibition. Prof. Houston was the Official Electrician of the Exhibition and Chairman of the Committee on Electrical Installation. Prof. Snyder was Special Chief of Measurements, Testing and Reports, and Chairman of the Committee on Conferences. They were both members of many other committees and took a prominent part in the Electrical Conference. A very notable address was also made by Prof. Snyder, recommending the establishment of a National Bureau of Standards adequate to the scientific and practical needs of the Nation. Prof. Thomson was the chief inventor of the Thomson-Houston Company, one of the exhibitors, and was also a member of the Conference of Electricians and took a prominent part in its discussion.

Writing recently respecting the Exhibition Prof. Thomson stated that "The Franklin Institute Exhibition was the first Exhibition in the country to be devoted to electricity alone, and during its continuance the first Electrical Conference came off. The Exhibition itself, as you will remember, was a unique collection of exhibits, showing practically the status of electrical work at that time in a fairly complete way, and the Electrical Conference referred to came at a time when great interest was being manifested all over the world in the future development of electrical applications."

One of the most remarkable features of The Franklin Institute Exhibition, which is perhaps unique in history, is that "the report of the Treasurer showed the Exhibition to have been a financial success. The entire expense of the erection of buildings, the cost of shafting and steam piping, as well as the running expenses, were promptly met" and a "balance of some $10,000 to $20,000" left in the Treasury. This was accomplished without

Government aid or the use of public moneys." In view of the fact that the Exhibition was in every other way a great success, the financial record is certainly refreshing and tempts one to believe that perhaps after all they knew how to do things better in some respects in the good old days.

CHAIRMAN CLARK: Before the Exhibition of 1884, and for a hundred and thirty-five years previously, when 16-candle coal gas was a luxury, sold, at perhaps $2.50 a thousand cubic feet and but little used, sales per capita amounting to 700 or 800 feet, we did not appreciate the influence and the value of bright light. We did not know that there was an arc light, and we did not know that a light equivalent to an arc light was as good as a policeman; in reality, we did not know what could be done for the protection of property and of innocence in our cities, until the gentleman who will speak next brought out his machine and his lamp. I do not know as much of the subject as you gentlemen do, but I know something of it, and I believe firmly that no man since the world began, has done more for the protection of person and property in the great cities than Dr. Brush, whom I now have the pleasure of introducing (applause).

DR. CHARLES F. BRUSH, Cleveland, Ohio: Mr. Chairman, ladies and gentlemen, when, two or three weeks ago I was invited to come down here on this occasion and say a few words, I did not hesitate, as Mr. Rice says he did, but I promptly declined (laughter). Some of my friends were so good as to point out the pleasure that I would forego and other considerations, and I consented to re-arrange previous engagements, and here I am. I will comfort you with the statement that I am not going to give you an address. I have endeavored today to ascertain from my friends what they would like me to say a few words about, but my efforts have been quite unavailing; they have not given me a hint. But we know we are commemorating the electrical exposition of 1884. That has been spoken of already, and as most of you know much of the history of the development of the great electrical industries since that time it occurs to me that perhaps I would better say a few words on the earlier history of these great industries with which we have become so familiar especially since the early period may be summed up in a few words, while what has been done since that time might well fill a library of many volumes.

In speaking of the early history of electrical development in this country, I cannot avoid being personal to some extent and I hope you will pardon that. At the time I became interested in the subject it was not much of a subject and there were very few thinking of it; and anyone who happened to take an interest in it was conspicuous for that reason.

I think, however, as this is a function in a way of the Franklin Institute, that too much cannot be said for that venerable and splendid institution. It is not too much to say that the electrical industries as we know them today were born and fostered in that institution, and I have particularly in mind the year 1877 when the Institute became ambitious to own a dynamo-electric machine, a thing very rare in those days, and they invited such makers as there were in the world to send in their apparatus and compete for the sale.

Professors Thomson and Houston, if I remember correctly, took entire charge of the electrical measurements which continued over a period of several weeks, and the contest excited considerable interest, I may say great interest in Philadelphia, and it may justly be said that the interest then aroused here and elsewhere, indirectly started the growth of our great industries

That was in the summer or autumn of 1877. In the spring of 1878 there began to be some little indication of commercial activity in the field of electric lighting and by the summer or autumn of that year, there was considerable activity in this field. It is interesting to note that the Philadelphian, Mr. John Wanamaker, lighted his great store almost wholly with electric arc lights. He had a plant by the autumn of that year consisting, I think ,of 20 arc lights of about the present size. That was far and away the largest electric lighting plant in the world, and it was in Philadelphia.

Of course some humorous things occurred in the early days of the industry. I remember on one occasion that when a small electric light outfit, perhaps a 20-ampere lamp, which was large for those days, was shipped to Cincinnati by the then Telegraph Supply Company, to one Dr. Longworth, an enterprising scientist of that city, I went down to show him how to run the lamp. It was exhibited in front of the building in which he had his office and of course attracted a great deal of attention. On the first evening it was shown a large crowd gathered in front of his establishment and you would hear various exclamations of delight. Here and there in the crowd you could hear some one person delivering a little impromptu lecture on the electric light, and he would have quite a hearing. You may some of you recall that in those early days, the lamp that first made its appearance had a large solenoid at the top, through which ran a rod that carried the carbon. One man who had collected quite an audience pointed to the solenoid and said: "Gentlemen, that is the can that holds the oil." The lamp had two rods at the sides. He pointed to them and said: "Those are the tubes which convey the oil to the lamp."

In the summer of that year, an exhibition was held at the Union Steel Screw Works in Cleveland. A dynamo was exhibited there which operated four electric lights on separate circuits with the non-series lamps, and quite a large company of invited citizens were present to witness the exhibition. One of the most prominent of the old Clevelanders seemed to be greatly interested, and pointing to the line wire between the lamps, which at that time was of bare copper, he asked me: "How large is the hole in that little copper tube through which the electricity passes."

The Superintendent of the shop, one of those men who knows everything, looked for five minutes, perhaps, at the running dynamo. There was more or less sparking on the commutator, as there always was on electric light dynamo commutators and he was ready to tell me all about it.

He said: "The electricity in that thing is generated by that revolving business rubbing the air up against them iron blades (meaning the pole shoes of the magnet) just like you get sparks when you rub a cat's back." I said this was a simple and beautiful theory but it was not entirely right. However, that did not affect him at all. He said: "It is perfectly clear; if you run that thing in a vacuum you would not get any electricity." He seemed to be so contented with his theory that nothing further was said about it. (Laughter).

Late in the fall of 1878 there first appeared the device known as the series-arc lamp, and I think we may call that year, 1878, the banner year in the early history of the electrical industry, because it was that device which made electric lighting from central stations commercially possible. I think we may regard that year as marking the birth of the electric lighting industry. Prior to that time the development of electric lighting had been slow, but after that it was very rapid, and as early as the spring of 1879, the Public Square, a little park of about ten acres in Cleveland, was lighted with twelve series-arc lamps, and it has been lighted electrically ever since. I am quite sure that was the first electric street lighting in the world on a commercial basis. That is not so very long ago, at least it does not seem so to me, although it may to some of you. I was introduced a week or ten days ago, at the opening of an electrical exhibition in Cleveland, by a chairman who said he had the pleasure of introducing a gentleman who was familiar with the electricity industry in 1779. (Laughter). I promptly claimed an alibi before anyone had a chance of asking me if I remembered the true inwardness of the Washington hatchet story current at that time. I got in ahead of them; I wasn't asked.

It is interesting to reflect that even at that time, 1879, when the industry had really made a start, we had no shop instruments such as we have now—no ammeters, voltmeters, and so on. We had to guess at almost everything. It was about 1881 when we first had instruments of that nature.

Many references have been made to the electrical exposition of 1884 that we are celebrating today, but it was my good fortune, my privilege, to attend an Electrical Exposition in Paris, in 1881, which was perhaps the first of its kind in the world. It was held in a large Palace of Industry there and was considered a great affair at that time, and it was. But while that was very early, I think we may say that most of the seeds of the great industry which have developed since were there. There were perhaps 100 arc lamps and about as many incandescent lamps, and all were used to light that great building, and it was thought they did it splendidly. And there were various types of dynamos, both alternating-current and direct-current and a few motors, which of course were all direct-current. And there was the telephone, of course; that was just beginning to attract great attention, and there was a crude form of storage battery which excited very much interest. There was a real trolley car, if I am not mistaken, which ran a few hundred feet back and forth outside the building when the electrical conditions were very propitious, which was not often (laughter). It was always crowded with passengers, many of whom had waited a long time for a chance to get aboard—quite as they do at the present time. (Laughter).

Going back a moment to the year 1878, which, as I have said, was the birth year of our great industries, the year from which they started into vigorous growth, I imagine that in the whole world outside of the telegraph, there was not invested in the whole of the electrical industries more than two or three hundred thousand dollars. I think that would be ample to represent them all, outside of the telegraph. In 1905, which was 27 years later, I had occasian to select some data as to the amount of capital invested in the electrical industries at that time, and to my surprise, I found it to be not less than four thousand million dollars in this country alone; and that is about one hundred and fifty million dollars a year on an average for the 27 years, or a half million dollars for every working day during the 27 years. Now, in the nine years since 1905, I imagine the investment has been on an average, three times as rapid. I think we are within bounds in estimating that for the last nine years, something like a million and a half dollars of new capital has been going into the electrical industry for every working day of that period; and the end, gentlemen, is nowhere in sight. I am glad it is not, because those who live will have the pleasure of seeing it develop, perhaps even more rapidly than we have. I know the hour is getting late, Mr. Chairman.

CHAIRMAN CLARK: You have an all night license.

MR. BRUSH: No, I don't want to talk all night. I did not intend to talk at all. I thank you, gentlemen. (Applause.)

CHAIRMAN CLARK: The electric machine that Dr. Brush speaks of as having been sent to the Franklin Institute is now on the floor. We have always been glad it was not larger, because one day the current from that machine went through Elihu Thomson, and he fell to the floor.

Many of us, those of us here who are gray, remember the single horse car that went "jog, jog," through the streets, and we can compare its slow rate of progress and the few people it carried, with the present rapid transit in and between cities; but we owe it to men, one of whom is with us tonight, and who, I hope will tell us what influence the exhibition about thirty years ago had on the electric railway business. I have great pleasure in introducing to you, Mr. Sprague. (Applause)

MR. FRANK J. SPRAGUE, New York City: Mr. Chairman, ladies and gentlemen: I am going to talk less than most of my predecessors. I know that will be the most welcome news I can give you. In fact, I begged to be excused entirely, because as I looked to the other side of the platform and saw that patient, grand old man of our electrical profession (great applause), who once unceremoniously fired me, and afterwards was present at the award to me of the Edison Medal, and who, I know, while sitting there very quietly, is hoping this meeting will come to a close, I am reminded of a little incident that happened on that aforesaid occasion. Tom Martin said to him, "Did you hear any of this?" "Not a word." "You must have enjoyed yourself." "I always do when I think by myself." (Laughter).

As I look about this association, and see the representatives of that great industrial fabric which is misnamed the National Electric Light Association, I am reminded of the fact that it ought to be named the National Electric Light and Power Association, because it was predicted some years ago by those who interest themselves more particularly in power that our great central stations must become diversified suppliers of electrical energy for every purpose, and in time the demand for power would outpace that for electric lighting. I believe I am safe in saying that already in Chicago, possibly in this city, and in New York even now, the capacity connected up for power purposes is greater than the enormous total used for electric lighting.

Your industry has been founded partly upon capital, but largely upon the efforts of inventors and engineers. Few inventions are the result of inspiration. They are simply engineering developments brought out at each period in answer to some impelling demand. It is said that necessity is the mother of invention. If that were a recent expression I think we could charge the phrase to the militant suffragists or the feminists. I hope, ladies, there are none of the latter in this audience, as the feminists have been defined as that class of individuals who hope for free love in a manless world (laughter and applause).

In this connection, I am reminded of a far away Indian tribe, visited by a man well known to most of us—Oscar T. Crosby, an old associate who resigned from the Army to become associated with me in the construction of electric railroads in the early days—where a peculiar habit, the complement of polygamy, polyandry, exists. For economic reasons, the inheritance of land or what not, marriage is somewhat limited in degree. The eldest of a family of brothers, taking unto himself a wife, shares his privileges with his younger brothers. If necessity be the mother of inventions, it is polyandrous, because here and there throughout the world there often appears the same invention, and as in the case of this tribe to which I have referred, if the child is one which is sufficiently attractive, we find that there are many parents claiming paternity for it irrespective of the facts. Most of us are inventors, engineers, electricians, or what not, partly because of environment and partly because of the early conditions in which we were placed. It was my good fortune to be graduated from the U. S. Naval Academy in 1878. I hesitate to go back a third of a century; it doesn't look so long backward, but it is a devil of a distance ahead, and I remember the rise in the firmament of the names of Edison and Gray, Brush and Bell, which fired my young imagination. One day I wrote to Edison: "May I stop and see you at Menlo Park? I want to show you an invention." He replied favorably, and so I came to him with an invention of a telephone. He looked it over, criticized it somewhat, made a few rough sketches of a somewhat better plan, and I suddenly lost interest. He said, "If you don't think I am right, go up into the laboratory and try it yourself." I went up stairs, but after I had been there ten minutes I had forgotten all about the telephone, and was intensely interested in an incandescent lamp which Mr. Edison was developing. Later, I went on a tour around the world, but I never lost sight of that vision of the coming electrical power, and I planned to leave the Naval service. Finally I did get home in 1880, for my examinations, and I was delegated for service on a training ship to teach young ideas how to shoot, but I still thought of that electric light, and I said to myself, "What a great opportunity this is to introduce it into the Navy." You know that then we midshipmen slept in hammocks and used tallow candles. I went down to the engine room, and casting my mechanical eye around discovered an old single-acting steam pump for supplying the boilers, with a fly-wheel, a water cylinder at one end and a single steam cylinder at the other, and I thought to alter that pump into an engine that would light the ship. I sent to Mr. Edison to see if I could get hold of one of his early dynamos as I wanted to try to light the Minnesota with electricity. He sent back word, with that horse-sense of his, that the engine I wanted to use would run that dynamo so irregularly that the electric light would be damned forever on board ship.

Two years afterward, in 1881-2, it was my privilege to be ordered to the second electrical Exhibition. The one that Mr. Brush spoke about was in Paris. This second one was in Sydenham, in the Crystal Palace, and there I became absorbed in admiration of the work of Mr. Edison, represented at that time by Mr. E. H. Johnson. There a battery of twelve Z machines, arranged in three groups, and requiring a total of about 100 hp to drive them. Remember that this was only thirty-two years ago, and to give you some idea of the advance from that date, look at the electrical plant in this city, where you are now installing a single turbine unit weighing 600 tons, with a normal capacity of 35,000 kilowatts, nearly 7000 times larger than the unit machine shown by the Edison company at the Sydenham Exhibition in 1882.

It was my pleasure at that time to report to the Navy Department in these words, regarding the Edison system:

"In the matter of making transmission of light and power a practical success, and bringing it home to everyday domestic economy, Mr. Edison, without doubt, has done more than all others."

But at this Exhibition there was not an electric railway, there was not an electric motor of any kind or character. There was no suggestion of anything, in matters of that kind, except the electric light.

In 1884 came your exhibition here in Philadelphia, and the only electric railway that was here was a small model railway put in by a Mr. Bidwell, I believe, deriving current from a brush passing through a slot, and operated within the building. Two years later in Boston, New York, Philadelphia and Baltimore I was operating, experimentally, single electric cars with storage batteries.

Mr. Van Depoele, now passed on to the beyond, and Mr. Leo Daft, who is still with us, had also become active in Richmond, and it was my pleasure in 1887 to inaugurate the pioneer modern trolley railroad, with what consequences to this industry you now know.

It has been stated that there was loom driving at this Exhibition. I have in my hand a cut from the first piece of cloth woven on a loom driven by a constant-speed, non-sparking, constant potential motor, one of my earliest productions.

The path of those who were active in the early developments was not always an easy one. I remember some twenty-three years ago, prior to the introduction of the multiple unit system in the operation of railways, and prior to determining what would be done on the subways of New York in the way of rapid transit, I took it upon myself in order to overcome the activities of the elevated railroad owners in the city of New York backed by the newspapers of that city, and to prevent the extension of elevated railroads, by publicly offering at the expenditure of $50,000, to put two electric trains in operation on the elevated railroad, one to be operated by a locomotive and one by motors under the cars, at a speed of 40 miles an hour. This was intended to demonstrate that the first thing to be done in determining rapid transit was to accept electricity as a motive power, but it took the rapid transit committee of that city many years to come to that conclusion. I know I attempted in 1886 and in 1887, and then again in 1896 to interest the elevated railroads of New York in electrical operation. I twice offered to make a demonstration at my own expense of the multiple unit possibilities with a full six or eight-car train, but it fell upon deaf ears, and it was not until two years after such offers that the opportunity came to make the first commercial introduction of that system.

One of the great ambitions of all of us has been to electrify the railroads of the world, especially the trunk line railroads. It has been a common prophecy of electrical engineers that main line railroads would be electrified early, and the steam locomotive thrown into the discard. Hopes have outpaced facts, for when the gilded electric giant, and gilded it must be because of the large amount of capital required, goes into the arena to meet its iron-clad opponent, the modern locomotive, on the basis of comparative economy of operation and capacity, it has a "hard row to hoe." In the urban, suburban and interurban fields and now also in terminal operation, electricity holds its own, because it deals with classes of traffic often impossible for like operation by steam, but when we get into the trunk line field, we must discard a great deal of existing investment, and incur large investments at a time when money is very difficult to raise.

Now how is the advance going to be made? Right with you, gentlemen, lies in a great measure the solution of that problem, for the matter of supply is more important than the question of system. Engineers have racked their brains and hoarsed their throats in arguing the merits or demerits of single and polyphase and high and low tension direct currents, but I tell you that neither one of these questions is as important as the question of power supply.

Every one who looks forward to the future of our country sees a spectre arise. What is it? The failure of our coal and timber supply, and the necessary consequences. With an ever increasing demand for power, we must then fall back upon water and hydraulic power, but meanwhile we must conserve all that we have. Mr. Insull has spoken of the limitation which may be imposed by law upon normal development. You can no more stop the extension of electric lines from one State to another than you can stop the travel on a country road; no more than you can put bounds upon agricultural fields, no more than you can dead-end the rails of a steam railroad. The small power plant must disappear, great power plants, properly located, must be erected and connected together by lines which are absolutely protected. In the end, these connections will be underground, not overhead, for protection against accidents to the public, for the same reason that the Bell Telephone Company runs its lines from Boston to New York underground, instead of overhead. Now when that time comes, since the demands of the electrified railways will be small in comparison with the aggregate diversified demands upon power plants, the steam railroad man can no longer say "Reliability cannot be had except under our supervision and control; economical production of power cannot be had except under our management." Then they must acknowledge, as is typified in Chicago, and here and elsewhere throughout the country, that the central station can often supply to a steam railroad power for its purposes in whatever quantity needed with greater reliability and at less cost than the railroad can create it for itself. (Applause).

So in time we shall have electric railways upon our trunk lines, but it is to you we must look rather than to the disputants as to systems. The natural power lines are the rights of way of the railroads themselves.

I was asked if I had any prophecy to make tonight. I have, and I do not hesitate to make one. Electricity is also going to help the operation of our trunk lines in a somewhat different way. In the United States there are not less than four hundred and fifty thousand to five hundred thousand miles of single track trunk line in operation, and over those are propelled millions of tons of freight and millions of passengers under the control of great power units, governed by intelligent engineers, backed by efficient braking systems. In front of every one of those engineers is a sign-board at every block which says in effect: "Keep off the grass because it is fresh," or "Here is danger." It is called a signal. On four-fifths of the railroads of the United States it is manually operated, but on the other one-fifth it is set and cleared by the trains as they pass. Every now and then a horrible accident occurs. Why? Because, according to the reports of the Interstate Commerce Commission, there is no reliable connection between that sign-board and the man who runs the train. Now I will make this prediction: Long before our main railroads are operated by electricity, we will materially increase their safety of operation by tying the sign-board and the engineer on the locomotive together electrically, so that when the man, whether from failing eyesight, adverse weather conditions, momentary inattention or what not, loses for a moment a knowledge of conditions in front of him, the human freight behind him will not go pell-mell into a collision, for the track conditions will be signalled into the train, and it will be braked and stopped in case the engineer fails to exercise the attention which is his duty. This is the prophecy.

Just a final word. We are not all of us engineers, and are not all commercial men, but there is at least one thing we can all together be proud of. We belong to that industrial profession which has done more for the safety and for the comfort of the world than all which preceded it; which represents typical American progress, which represents modern industry, and conveys the hope of the future to our posterity.

Gentlemen, I thank you. (Applause).

CHAIRMAN CLARK: Ladies and gentlemen, the Franklin Institute has been honored by your presence, and we thank you, and particularly, the distinguished gentlemen who have come to Philadelphia to attend this commemorative meeting.

You have heard of the glories of our past. We are not of the past, but of the present, and the continuing present, not "we" personally, but the Franklin Institute, for the promotion of mechanical arts, which has served four generations, and is still serving the citizen and the State, and will continue so to serve as long as the citizen and the State need it.

President McCall: I am certain, gentlemen, that we owe a debt of thanks to the Franklin Institute; and I shall ask the Committee on Resolutions to make proper recognition of it in framing resolutions to be presented to the meeting on Friday.

The meeting will now stand adjourned.

With reference to the Public Policy Committee and the festivities of Wednesday evening the following items from the *Convention Daily* and *Electrical World* will be of interest to the members.

"An enjoyable dinner was given last evening in the Red Room of the Bellevue-Stratford Hotel to members of the Public Policy Committee and other distinguished guests by Mr. Arthur Williams, chairman of the Committee, and President J. B. McCall. Fifty covers were laid. The table presented a beautiful appearance, ferns, cut flowers and an electric fountain composing the decorative scheme. The 'place cards' consisted of convention numbers of the Philadelphia Electric Company Section magazine *Current News* in individual gilt-lettered leather bindings. At the close of the dinner there were informal addresses, and a pleasurable feature was the presentation by Mr. Williams, as presiding officer of the last New York Electrical Show, to Mr. Thomas A. Edison, the guest of honor, of a solid gold medal bearing the portrait of the great inventor."

"The Public Policy Meeting of last night may be said to have opened with the entrance of Mr. Edison escorted by Mr. Samuel Insull of Chicago. Rising to its feet the large audience which filled the ballroom and the gallery welcomed the Wizard with a rousing round of applause. President McCall opened the session, and in few words introduced the chairman of the Public Policy Committee, Mr. Arthur Williams of New York, who in turn introduced Mr. Insull, to whom was entrusted the reading of the Report of the Committee."

THIRD GENERAL AND SECOND EXECUTIVE SESSION

FRIDAY, JUNE 5

PRESIDENT McCALL: The first business of the meeting this morning is the Report of the Committee on Doherty Company Section Medal and Other Prizes, to be presented by Mr. Holton H. Scott, Chairman.

REPORT OF COMMITTEE ON DOHERTY SECTION MEDALS AND OTHER PRIZES

MR. PRESIDENT AND GENTLEMEN: Your Committee begs to report that there were thirteen papers submitted in competition for two prizes. The first prize is the Doherty Company Section Medal, and the second is the Harriet Billings cash prize of fifty dollars, donated by Mr. Arthur Williams.

Both of the prizes are offered annually, and the only condition is that the papers must have been read before a Company Section meeting during the previous year.

Your Committee recommends that the Doherty Medal be awarded to Mr. Harold Goodwin, Jr., of the Philadelphia Electric Company, who presented his paper entitled, "Practical Economies in Distribution with their effect on the Commercial Policy of a Central Station Company" before the Philadelphia Electric Company Section, December 1, 1913. We recommend that the Harriet Billings Prize be awarded to Mr. H. B. Gear of the Commonwealth Edison Company of Chicago, who presented his paper entitled "The Distribution System and the Cost of Electric Service," at the November, 1913, meeting of the Commonwealth Edison Company Section.

Both of these papers have great merit, and we recommend that they be published in the regular Proceedings of this Convention.

We also desire to make honorable mention of the paper entitled "Chestnut Poles," presented by Mr. Thomas Sproule, before the Philadelphia Section, April 7, 1913.

Respectfully submitted,
HOLTON H SCOTT *Chairman*
PAUL SPENCER
PAUL LÜPKE

PRESIDENT McCALL: Gentlemen, you have heard the Report of the Committee. Is there any discussion? (On motion, duly seconded, the report was received.)

I congratulate the successful contestants on winning the prizes.*

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* Prize Papers are published with the Proceedings of the Hydro-Electric and Technical Sessions.

The next business before the meeting is the address on "The Definite Plans of the Society for Electrical Development," by Mr. J. M. Wakeman, New York City. I might say for those who are not familiar with the plans of the Society for Electrical Development, that they are now practically in a position to proceed with the work outlined last year at the Chicago Convention. It is interesting work, and work which will be of great aid in the development of the business, if properly treated. I am quite certain, from what I know of the plans of the Society, that it is their intention to so treat it.

THE DEFINITE PLAN OF THE SOCIETY FOR ELECTRICAL DEVELOPMENT

When I had the pleasure of addressing you in Chicago a year ago, I was able to lay before you only an outline of some of the plans which had been suggested for The Society for Electrical Development. I am very pleased this year to come before you representing an active working organization, and to be able to outline the plans which have been definitely decided upon and which are now being carried out by the Society.

Everybody—the great public, the manufacturer of anything for which power is used in the making, everybody in the electrical industry, whether making, selling or installing electrical apparatus or making and distributing electrical current—is interested in knowing what, how and why things are done electrically, and what, how and why other things should be so done. The public needs education along these lines, and the plans adopted by The Society for Electrical Development for its first year's activities indicate some of the methods by which the Society proposes to carry on this necessary work, and at the same time to furnish valuable information to its own members.

The Society is preparing to organize the allied interests into local leagues, to secure the personal support and co-operation of the members of the Society in each district, so that they will all work together for the intensive cultivation of the electrical business in the territory in which the local organization is formed.

Part of this local work will be done through co-operative advertising, through aiding in local legislation as to local inspection of wiring, local wiring codes and such matters; also by being able to present to the local governing bodies ordinances regulating electric signs, street lighting, etc., in other cities. This part of the Society's work will include co-operation with the local interests in the preparation of electrical pages, furnishing information regarding electric shows, etc.

It is intended that the Society shall take an active part in all conventions where users of electricity get together, arranging to present papers by representatives of the Society on some application of electricity of interest to that particular convention.

The field representatives of the Society will devote a portion of their time to co-operation with architects, builders and engineers, so that these may be informed as to the proper method of writing specifications for the installation of electric light, heat and power, these specifications to embody the use of everything electrical that is available on the American market.

As the text books used in public schools on electrical subjects are very apt to be behind the times, the Society will co-operate with the publishers of text books with a view to bringing these up to date. It is also the intention of the Society to co-operate with school boards by furnishing moving picture films, lectures and stereopticon exhibitions showing the progress in the world of electric service. In this work the local central station company is expected to co-operate actively. Visits to large manufacturing plants where electric drive and other uses of electricity could be pointed out, can also be arranged for high schools.

There are numerous business men's associations in our cities, and by putting jobbers, contractors, manufacturers and central stations in closer touch with these boards of trade, chambers of commerce and other business associations, great good can be accomplished.

The Society has engaged as a traveling engineer a man whose experience in the electrical field has particularly fitted him for the work of investigating, of compiling up-to-date information as to the various uses of electricity in the different industries, and for suggesting every possible use of electricity for light, heat and power in factories, mills, etc., as well as in the home and on the farm.

It is very difficult at the present time to secure such information; some of it has been published in different periodicals, but it has not been brought together in a comprehensive way. Information as to the requirements of power in the various industries, together with the price per unit of output that the consumer could afford to pay for power, would be invaluable to central station companies. Analyzing the application of electricity to the industries will undoubtedly show that none of them has been equipped to the limit of possibility, and the Society proposes to make practical suggestions as to the further uses of electricity in all industries.

There is a great work to be done for central stations throughout the country in developing an increased demand for electric service in the home. This can be done to a large extent by securing and disseminating information among the central station members as to how such a demand has already been developed elsewhere, and by outlining new business campaigns.

There are innumerable examples of heating throughout the country, but the number of them in use in proportion to the prospective list is absurdly small. There is no place where one can obtain information covering what has been done in this connection, much less what might be done. The Society for Electrical Development can help central station companies to get this kind of business, and can bring manufacturer, central station and dealer together in the production and sale of such apparatus: the assistance so rendered will alone justify membership in the Society.

This work cannot be accomplished through any other medium than The Society for Electrical Development, except at an expense which prohibits any one company attempting it: and it will create a feeling among manufacturers of all classes that electricity is adaptable to most processes requiring heat, light and power in their establishments.

The Society has established a Commercial Exchange Bureau, and has engaged as manager of this bureau an electrical engineer who is thoroughly capable of collating general information for the use of our members and the public, filing and indexing it in such a manner as to render it easily available. This bureau will prepare bulletins or pamphlets explaining the various uses of electricity, prepare data for articles of similar character for the trade journals and for convention papers, and carry on the necessary correspondence upon such subjects with the members of the Society and the public. As an example: when our traveling engineer investigates an industry and finds that electricity has been used to some extent in that industry, but that it is capable of much further and more extended use, his report to the Commercial Exchange Bureau will contain all the information obtainable on the present uses of electricity, how and why it is used, together with the suggestions as to what more could be done electrically, how and why it should be so done. This information will be properly filed and indexed and will be available for the use of our members. An article or articles will be prepared, dealing with the uses of electricity and its possible extension in that particular industry. The articles will be supplied through our Editorial Department to one of the leading trade papers in that industry and will be reprinted and sent out in pamphlet form to the biggest manufacturers engaged in that industry, and to the central stations where such industries are located.

The Editorial and Advertising Department is at work providing news items and electrical stories for local papers, and describing electrical inventions, improvements or applications, compiled in news form.

This department will provide an advertising copy service for members of the Society to assist them in conducting their advertising in the best possible manner, and will also carry on discussions in regard to newspaper advertising before meetings of the various electrical associations, so that the greatest number of firms engaged in the electrical business will be informed upon the value of newspaper advertising and how, through this means, to bring about increased interest in and demand for everything electrical.

This part of the Society's plans provides for well-written stories by magazine writers of good reputation, suggesting the use of things electrical by the householder, by the merchant and by the factory owner, the stories to be prepared by men of ability so that they will either be accepted on their merits or be sufficiently interesting to be paid for by the publishers, in this way cutting down the cost to the Society of having the work done.

The Society has arranged for the preparation of moving pictures suggesting the use of things electrical and illustrating their uses in the home, the factory, and on the farm. This is one of the most effective methods of interesting and educating the public to "Do It Electrically." The films are now being made and will be in use very shortly.

The Society is having a number of windows trimmed with electrical supplies, the displays being made in a novel and effective manner. Two photographs of each window are taken, one showing the fixture setting and the other the completed window. These photographs are reproduced in half-tone and sent to the members of the Society who have show windows, together with printed instructions as to how to dress the windows to obtain the effects shown. Such photographs and instructions will be sent out at regular intervals during the year, and it is felt that this work will give the smallest and the largest member a concrete exhibit of the definite help that the Society is in a position to furnish to its members. From the experience of large manufacturers specializing in this form of advertising, it is concluded that this is one of the most important activities that the Society can participate in for the development of the electrical industry.

The Society plans to demonstrate to the owners of houses not already wired the advisability and practicability of adopting electric service and to educate the people who are already using electric lighting to the advantages of the various electrical devices which can be introduced into the household as labor-saving devices, or add to the comfort and convenience of the home. This will develop the latent market, as will also the campaign which we purpose to carry on in the trade papers of the country, advocating the use of electric motors in industrial plants and pointing out the many possible applications and advantages of electricity.

All this additional business means to the manufacturer of motors and other devices larger opportunities for business, which means more trade for the supply jobber and dealer; it means more work for the contractor, and more revenue for the central station.

The central station is in a position to benefit by every sale made through the work of this Society. Every time the Society succeeds in inducing a householder or a manufacturer to put in an energy-consuming device which otherwise would not have been sold, it brings added revenue to the central station. In fact, the central station is the residuary legatee of the work of this Society and should be its chief support. Some central stations feel that their field is entirely local and they cannot see any advantage in subscribing to a national effort. As a matter of fact, the educational campaign which this Society proposes to carry on is of a character that no central station can afford to undertake alone. It is not intended to take the place of the local advertising and local effort for business but to enhance the value of the latter.

The particular object of the Society is to promote and increase the use by the public of electric current for all useful purposes both as an end in itself and as a means for increasing the demand for apparatus and supplies. To promote and facilitate a co-operative planning and execution of various means and methods effective to this end, it is essential that all the electrical interests should contribute toward bringing about the results desired.

Central stations could very materially assist this movement by making a special rate to householders for power and heat, using separate circuits and putting in separate meters and special plugs where necessary and justifiable.

We have a membership to-day of 1372 companies and while this is a very good showing, it by no means represents the possibilities of the Society. Remember that if we can increase the business only 5 per cent it means an increase of $5,000,000 in the electrical business of the United States.

Lest there be a feeling that having raised $200,000 there is no necessity to try for more members, I would invite your attention to the fact that in a movement of this kind in order that it may be genuinely co-operative it is necessary to have the active support of everyone engaged in the industry, and that the efficiency of the Society is in exact proportion to its membership—the greater the membership, the larger the income—the more effective will be the work of the Society. I wish therefore to urge everyone here who is not already a member to join this great, broad active movement for the benefit of all engaged in the industry.

As a matter of fact, the work of the Society for Electrical Development is calculated to do more for the central stations than for any other class of members. The central station gets the benefit of every new use and every new user of electricity.

I am not pleading with you to put this Society on the map. It is there now and central stations all over the country will reap the benefit of our work whether they contribute toward the cost of it or not. Not many have expressed their willingness to let the other fellow pay, but quite a number have shown a good deal of ingenuity in framing excuses for watching the game from a neighbor's window instead of paying the price of admission. It is quite common experience to be told by the Vice-President or General Manager of a central station that he would like to put his company in but has not the authority to pledge the $123 or whatever it may cost, and that all such matters must be referred to Mr. So-and-So of such and such a company in New York, Chicago or Boston, as the case may be. Then we go to see this man and find him busy signing company bonds which he hopes the public will buy. Surely, one thinks, he will gladly join the movement intended to help in earning dividends, to help in strengthening and steadying the market for those bonds; but no, he states that they have so many companies and do so many millions of business that they cannot afford to come in and do their share with us.

Now the fact is that each subsidiary company can well afford the 1/15 of 1 per cent it would cost to join us, and in most cases needs the co-operation of the Society to help in local intensive cultivation, yet Mr. So-and-So, who would regard the amount of the aggregate subscriptions as picayune if he were trying to procure the money of a prospective investor, talks as if it were a fortune when it comes to his investing it.

Some central stations are not in because they are small and struggling for existence and really cannot afford even the few dollars it costs to be in the game, while some plead that they are doing so much business and making so much money that their subscriptions would be very large, and so on and so on. These are merely excuses, not reasons.

Gentlemen, I don't care how big or how small your subscription would be. The Society for Electrical Development and your company need to co-operate. There is a big latent market to be developed. This Society is formed to develop it. Central station men are at its head, central station men are on its Board of Directors and on its committees. Central station men helped to formulate its policies and central station men owe it to the industry and to their own companies to belong to it and to participate in its work.

PRESIDENT McCALL: The next business on the program is a "Symposium: Relations of the N. E. L. A. with State and Geographic Sections." I do not know that there is any special occasion to have such a symposium at this time, but it was placed on the program to give an opportunity to anybody who might care to discuss the relations between the Sections and the National Body. Is there to be any discussion on this question? If not, we will proceed to the next business which is the Report of Committee on Memorials by Mr. T. C. Martin, New York City.

MR. MARTIN: This is a melancholy task which falls to me each year, and I may say that the year which has gone by has taken from us, not only some of our most distinguished members, but men whom we can characterize as great American citizens, and whom we were very glad, indeed, to include in our list of membership. I will simply give you the names of those who have died, and the usual biographical sketches will appear, by permission, Mr. President, in the Annual Proceedings.

REPORT OF COMMITTEE ON MEMORIALS

The names included are those of Messrs.

Anthony, S. Reed
Apperson, R. D.
Barton, Daniel M.
Brady, Anthony Nicholas
Calisch, J. C.
Catchings, E. F.
Chapin, Charles Augustus
Cooper, William
Cummins, James S.
Davidson, Wilbur F.
Dyer, Richard Nott
Francisco, M. Judson
Gamewell, William W.
Hodgson, Joseph Ernest
Houston, Edwin J.
Lee, F. V. T.
Michener, A. S.
Morse, Charles W.
Pass, James
Peart, L. N.
Prichard, Charles F.
Richards, Henry M.
Soden, Francis H.
Stevens, Grafton
Westinghouse, George
Wiley, James R.
Winchester, Reuben Clark

S. Reed Anthony, president and director of the Manchester (N. H.) Street Railway Company, and treasurer and director of the Manchester Traction, Light and Power Company, died at his home in Boston, March 10, aged 50 years. Mr. Anthony was a direct descendant of Miles Standish and of John Alden. In early life he was in the employ of Kidder, Peabody & Company, and later organized the banking firm of Tucker, Anthony & Company, which became largely interested in electric railway development in the middle States. More recently the firm has been identified with water power development in Minnesota and California. Mr. Anthony was a member of the New York Stock Exchange and a director of the Northwestern Power Company. He belonged to numerous societies.

R. D. Apperson, until recently president of the Lynchburg (Va.) Traction and Light Company, died at Santa Monica, Cal., Oct. 6, 1913. He was born in 1863 and in 1886 became connected with the Little Rock, (Ark.) & Citizens Street Railway, remaining with that company until 1890, when the property was sold. He then went to Staunton, Va., where he built an electric railway, of which he assumed the management, and later also built and operated at Staunton an electric light and gas plant. Mr. Apperson and his associates purchased the property of the

Petersburg (Va.) Gas & Light Company and the Lynchburg Gas Company in 1899 and two years later acquired the Lynchburg Electric Railway and Light Company and the Lynchburg and Riverton Street Railway. These properties and that of the gas company were afterward consolidated as the Lynchburg Traction and Light Company. In 1903 the Apperson interests purchased the property of the Roanoke Railway and Electric Company, and when, in 1910 the American Railways acquired the property of both the Lynchburg Traction & Light Company and the Roanoke Railway and Electric Company, Mr. Apperson continued as president and general manager of both and became a director of the American Railways. Mr. Apperson resigned as president of the Lynchburg Traction and Light Company but continued as chairman of the board of directors of the new company and of the Roanoke Railway and Electric Company.

DANIEL M. BARTON, general purchasing agent of the General Electric Company, died at his home in Schenectady of heart failure on December 5, 1913. He was born in Moriah, N. Y., in 1843. His father, Silas D. Barton, a farmer by occupation, moved his family to Ware, Mass., while his children were still young. It was there that Mr. Barton spent most of his youth up to the age of nineteen when, together with his brothers Henry and Silas A. he enlisted in the army. After his return from the war he became a dry-goods merchant in Meriden, Conn., following which he moved to Lynn, Mass., where he followed the occupation of bookkeeper and newsdealer. In 1883 the Thomson-Houston Electric Company was formed by citizens of Lynn, one of the leading spirits among them being Silas A. Barton, and the company was established there. Three years later Mr. Barton entered the employ of that company and became its first production manager, under Mr. E. W. Rice, Jr., then superintendent. During his administration of this office and inspired by the first large railway contract secured by the company for electrifying the West End Street Railway Company, Boston, Mass., he devised and inaugurated some novel and successful systems of scheduling, regulating and expediting production, which attracted wide attention. In 1893 Mr. Barton became assistant purchasing agent of the General Electric Company, which had been formed the previous year. With the removal of the department to Schenectady, after it was decided early in 1894 to make that city the headquarters of the Company, Mr. Barton was appointed purchasing agent, this title being changed to general purchasing agent some years later. This position he filled ably and loyally up to the time of his death. He is survived by his widow, a daughter and three grandchildren.

Mr. Barton was a Christian gentleman, exceptionally devoted to his home and family. He had deep human sympathies, which he extended to all, which coupled with stern integrity and a scrupulous sense of justice made him a respected and lovable character.

ANTHONY NICHOLAS BRADY, the well-known public utility magnate of New York and Albany, died in London, England, July 22, 1913, from angina pectoris. He had arrived only the previous day from New York, having taken the trip in the hope of benefitting by the change. Mr. Brady was born August 22, 1843, at Lille, France, of Irish parents, with whom he came to the United States and settled in Albany, N. Y. He attended school until he was thirteen years old, when he went to work, and for a time was employed at the Delevan House, an Albany Hotel, where he remained until he became of age. Then he seized opportunities for the acquisition of public utility properties and their development, which gave play to his remarkable organizing and financial ability, and the result of his work in upbuilding his interests is a well-known story.

His career was at its zenith when the end came. His personal influence, however, went beyond the sixty large corporations in which he was a director and his interests included those of transportation, electricity, gas, rubber and paving materials. He was a power in the American Tobacco Company and also made much money in the oil industry. Mr. Brady was best known, however, as a promoter of public service corporations. He first purchased the gas plants in Albany and Troy, N. Y., and in Chicago, and then began to buy up trolley lines, first in Albany and then in other cities, and also electric light plants. A list of the purely electric public utility companies in which he was interested follows: Astoria Light, Heat & Power Company, Long Island City, N. Y.; Consolidated Gas Company of New Jersey, Long Branch, N. J.; Consolidated Light & Power Company, Whitehall, N. Y.; Edison Electric Illuminating Company of Brooklyn, Kings County Electric & Power Company of Brooklyn, New York Edison Company, United Electric Light & Power

Company, New York; Consolidated Gas, Electric Light & Power Company, Baltimore; Glens Falls Gas & Electric Company, Louisville Lighting Company, Memphis Consolidated Gas & Electric Company, Northern Westchester Lighting Company, Peekskill Lighting & Railroad Company, Yonkers Electric Light and Power Company, Municipal Gas Company of Albany, United Gas, Electric Light & Fuel Company, Fort Edward, N. Y.; Troy Gas Company, Dayton Light, Heat & Power Company and the Chattanooga & Tennessee River Power Company. He was also a member of the Board of directors of the Westinghouse Electric & Manufacturing Company. He is survived by his widow, his son, Nicholas F., who succeeded him recently as president of the New York Edison Company, another son, J. C. Brady, and three married daughters.

J. C. CALISCH, special agent of the railway department of the General Electric Company, died in New York on Nov. 28, 1913. Mr. Calisch was graduated from Stevens Institute of Technology, in 1887 and served his apprenticeship with the Electric Storage Battery .Company in Philadelphia. In 1890 he entered the New York Office of Edison General Electric Company and remained with this company when it merged with the General Electric Company in 1892. In 1895 Mr. Calisch was appointed manager of the Pittsburgh office, and in 1899 manager of the Buffalo office. In 1906 he resigned to become vice-president and general manager of the Buffalo & Lake Erie Traction Company. In 1912 he resigned from this company to return to the General Electric Company in the capacity of special agent in its railway department. Mr. Calisch was only forty-six years old.

F. F. CATCHINGS, a well-known Southern electrical engineer, was drowned off Atlantic Beach, Fla., Sept. 21, 1913. He was educated at Emory College and Vanderbilt University and for several years was chief electrical engineer of the Georgia Railway & Electric Company of Atlanta, Ga. At the time of his death he was superintendent and electrical engineer of the Alabama Power Company of Birmingham, Ala., having gone to that city from Atlanta about one year previous.

CHARLES AUGUSTUS CHAPIN, president of the Indiana & Michigan Electric Company, of South Bend, Ind., died at his home in Chicago on Oct. 22, 1913. He was born in Edwardsburg, Mich., in 1845, but while he was very young his parents moved to Niles, Mich., and Mr. Chapin made his home there until fifteen years ago, when he removed to Chicago. He had been ill for about two months and died of heart disease. In early life the deceased was associated in business with his father, Mr. Henry A. Chapin, and together they established the South Bend Electric Company in 1883. Out of this company grew the present Indiana & Michigan Electric Company, which develops about 25,000 hp, principally in hydroelectric plants in northern Indiana and southern Michigan. This company was organized by Mr. C. A. Chapin and has water-power plants along the St. Joseph River at Elkhart and Mishawaka, Ind., and Buchanan and Berrien, Mich. It also maintains a steam generating plant, normally held as a reserve, at South Bend, where the general offices of the company are located. Mr. Chapin was a man who avoided publicity and, although connected with the electric-service industry for thirty years, was not widely known among electrical men. He was, however, a man of quick wit, fond of a joke and was highly regarded by his associates. He was a member of the Union League, Glen View, Chicago Yacht and other clubs.

WILLIAM COOPER, director of buildings and equipment of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., died of appendicitis at his home in Wilkinsburg on Jan. 23rd. He was born near Watertown, N. Y., Nov. 24, 1861. At the beginning of the nineties he was chief engineer and master mechanic of the Twin City Rapid Transit Company, of St. Paul, Minn., whence he went to join the engineering department of the General Electric Company. There he did some valuable work in connection with the effect of high density in armature cores on the commutation of railway motors. After leaving Schenectady, Mr. Cooper became general superintendent of the Bullock Electric Manufacturing Company in Cincinnati, Ohio, where he developed the multiple voltage system, which was epoch-making in the operation of electrically-driven machine tools. He also developed the teaser system for the operation of printing presses. After leaving the Bullock company, he joined the Westinghouse Electric & Manufacturing Company, where his inventive faculties found scope in the development of the electro-pneumatic system of multiple-unit train control. His personality was also a great factor in the Westinghouse organization and led to his becoming director of the buildings and equipment of the company, which position he held at his death.

James S. Cummins, senior member of the law firm of Cummins, Stearns & Milkewitch and vice-president, director, senior counsel and one of the founders of H. M. Byllesby & Company, died on March 23 at his home in Chicago. Mr. Cummins was born in Pennsylvania in 1857. He was a graduate of Swarthmore College and was admitted to the bar in his native state in 1882. In 1889 he was married to Alice Charlotte Byllesby. Two years later he went to Chicago and became counsel for the Thomson-Houston Electric Company in Chicago when the latter company was organized in 1892. Ten years later he helped to found H. M. Byllesby & Company, and he was closely connected with that extensive public utility organization until his death.

Wilbur F. Davidson, of the Port Huron (Mich.) Light and Power Company, died at his home in that city on June 18, 1913. Mr. Davidson was a pioneer in central-station installation and operation in the State of Michigan. He built the first electric plant installed at Port Huron. His son, Mr. James E. Davidson, vice-president and general manager of the Pacific Power & Light Co., Portland, Ore., is well known in electrical circles on both the Atlantic and Pacific coasts, having been connected with the Consolidated Lighting Company of Montpelier, Vt., and a past-president of the Northwest Electrical Association and of the New England Section of the N. E. L. A.

Richard Nott Dyer, for many years chief patent attorney for Thomas A. Edison and a member of the law firm of Dyer, Dyer & Taylor, died at his home in Orange, N. J., Jan. 13th. Mr. Dyer was born in Calais, Me., fifty-six years ago and was graduated from the Columbian University, Washington, D. C. He was admitted to the bar in Chicago in 1879, and two years later went to Menlo Park, N. J., as Mr. Edison's attorney. He fought the famous patent case of the incandescent lamp through all the courts to the United States Supreme Court, obtaining numerous decisions which ever since have been quoted in kindred patent cases. He also prepared the patents on the Phonograph and Kinetoscope and carried these cases through the courts. Later he became counsel for the Sprague Electric Company and for several years had charge of much of the patent work of the General Electric Company.

M. **Judson Francisco**, a former president of the National Electric Light Association, died at his home in Rutland, Vt., October 6, 1913, at the age of 77 years. He was a native of West Haven, Vt., but at the age of 16 he went to Ohio, and received his college training at Oberlin. In 1861 he became president of the Northwestern Commercial College, Fort Wayne, Ind. Mr. Francisco became Vermont manager for an insurance company in 1870, and carried on that business up to the time of his death. His connection with electric lighting interests began in 1888 when he was made president and general manager of the Rutland Electric Light Company. He continued in this position until 1900. He was a member of the Executive Committee of the National Electric Light Association in 1890 and become president of the Association, at Washington, in 1894. He was for a time secretary and managing director of the Rutland City Electric Company. One of his distinguishing characteristics was his readiness to attack government and municipal ownership at every opportunity. He was author of a review of the Postmaster-General's Limited Post and Telegraph Bill, which was delivered before the committees of Congress in 1891. He was also the author of "Municipal Lighting;" "Government Ownership;" "Review of Municipal Monopolies;" "Municipal Ownership—Its Fallacy;" "Municipal Ownership vs. Private Corporations" and "Business of Municipalities and Private Corporations Compared." In connection with measures involving questions of public ownership of utilities he appeared as expert before the legislatures of Massachusetts and Connecticut. He was a member of the American Institute of Electrical Engineers and a Mason. The widow and one son survive.

William W. Gamewell, former treasurer of the Stanley Electric Company of Pittsfield, Mass., and a director of electric companies at Greensboro, N. C., Madison and Sheboygan, Wis., died at Sheboygan on Sept. 21, 1913.

Joseph Ernest Hodgson, general manager of the Fulton County Gas & Electric Company, Gloversville, N. Y., died in that city on Oct. 26, 1913. He was born in Brooklyn, N. Y., May 27, 1873, and was a graduate of the Polytechnic Institute of Brooklyn and of Cornell University. After leaving Cornell in 1897 he entered the employ of the Brooklyn Rapid Transit Company and in 1902 joined the staff of the Westchester Lighting Company, Mount Vernon, N. Y., which at that time was under the direct control of the United Gas Improvement Company of Philadelphia. When in 1907 the Westchester corporation became affiliated with the interests controlling the Consolidated Gas Company, Mr. Hodgson joined the home engineering corps of the United Gas Improvement Company in Philadelphia and was subsequently detailed to St. Augustine, Fla. He remained for only a short time in that position, going to Gloversville, N. Y., as engineer of the electric division of the United Gas Improvement interests in Gloversville and Johnstown. His success was so marked that when the position of general manager of the Fulton County Gas & Electric Company became vacant he received the appointment. This position he held until his death.

PROF. EDWIN J. HOUSTON died at his home in Philadelphia of heart disease on March 1st. He was born in Alexandria, Va., July 9, 1847, and educated principally in the public schools and in the Central High School of Philadelphia, which institution he served long and faithfully as professor of physical geography and natural philosophy. He first taught at Girard College, and not long afterward was elected professor of civil engineering in the Central High School, only to be transferred a year or two later to the chair of natural philosophy, of which he was professor emeritus at the time of his death. About 1879 Professor Houston took up the then comparatively new subject of electric lighting and in conjunction with Professor Elihu Thomson, who like himself was a teacher in the Philadelphia Public Schools, elaborated the Thomson-Houston system of arc lighting which in 1881 made its appearance and not long afterward won its way into prominence all over the civilized world. The Thomson-Houston dynamo created something of a sensation. Its spherical armature was unique among armatures; its cup-shaped field magnets were unique among field magnets, and its 3-part commutator was unique among commutators. The dynamo embodied many novel features, not the least of which were the air blast used to extinguish the sparks occurring as the segments passed under the brushes, and the regulating magnet and gear used for automatically shifting the brushes so as to maintain a constant current. Professor Houston was in 1884 appointed by the National Government a member of the United States electrical Commission, which convened in Philadelphia, and he was also elected by the

Franklin Institute chief engineer of the International Electrical Exhibition. Professor Houston became prominent in electrical research and investigations of every sort, and he devoted not a little time to the popular exposition of the science in which he had attained so enviable a reputation. He resigned from the Central High School about 1895 and became associated with Dr. A. E. Kennelly, now of Harvard University, as a consulting electrical engineer. His contributions to the literature of natural science have been numerous, and a considerable number of meritorious books have come from his ready pen. Of his fifty books the two best known to the electrical fraternity are the "Dictionary of Electrical Words, Terms and Phrases" and "Electricity in Every-Day Life" together with the electrotechnical series written in collaboration with Dr. A. E. Kennelly and published by the *Electrical World* years ago. The latter were among the first primers on electrical subjects appearing in any language. Professor Houston was president of the American Institute of Electrical Engineers in 1893, 1894 and 1895. He was professor emeritus of physics at Franklin Institute, professor of physics at Medico-Chirurgical College, a member of the American Institute of Mining Engineers, the American Philosophical Society, the Electro-therapeutic Society, the American Historical Association, the New York Electrical Society, the Philadelphia Academy and numerous other scientific organizations. He was president of Section C of the Electrical Congress held in Chicago in 1893 and the first president of the electrical section of the Franklin Institute. He received the honorary degree of Ph. D. from Princeton University.

F. V. T. LEE, who was one of the best known electrical engineers on the Pacific Coast and associated with Messrs. J. Martin, E. J. De Sabla, Jr., and others prominently identified with hydroelectric developments in California, died at Victoria, B. C., on Aug. 14, 1913. Mr. Lee was a native of England and came to America at the age of seventeen, entering the employ of the Manhattan Electrical Supply Company in New York City. While there he attracted the attention of the late Dr. F. A. C. Perrine, at that time professor of electrical engineering at the Leland Stanford, Jr., University and later chief engineer of the Standard Electric Company of California. Dr. Perrine induced him to go to California and enter the Leland Stanford, Jr., University, where he worked his way through. Mr. Lee had a hand in the construction of several of the hydroelectric plants which are now the property of the Pacific Gas & Electric Company. In 1906 he left John Martin & Company and entered the service of the Pacific Gas & Electric Company, with which he remained until 1910, being assistant general manager of the company when he resigned and went north. Mr. Lee was a member of the American Institute of Electrical Engineers and several kindred societies.

A. S. MICHENER, vice-president and controller of the Puget Sound Traction Company, Seattle, Wash., was drowned on Sunday, August 3, 1913, while on a fishing trip up the Homahoma River, near Seattle. Mr. Michener, with five other members of the company, left Saturday as guests on the launch of Mr. J. Sodenberg, a prominent business man of Seattle. Arriving at their destination, the party started up stream on foot, and it is supposed that Mr. Michener, while fishing alone, slipped. His dead body was discovered half an hour later. Algernon Stanley Michener was born in Washington, D. C., in 1869, and was a son of the late Captain John E. Michener. After being graduated in law from Georgetown University, he entered the American Ordinance Company, later joining the Stone & Webster organization. He left Boston for Seattle in 1912 to become associated with the Puget Sound Traction Company. He is survived by a widow.

CHARLES W. MORSE, president of the Gainesville (Fla.) Gas and Electric Company, died at Gainesville on June 11, 1913, at the age of sixty. Mr. Morse, who was a native of Haverhill, Mass., at one time owned the gas plants at Marlboro and Quincy, Mass., and Rochester, N. H., and was also one of the owners of the Amesbury (Mass.) Gas and Electric Light Company.

JAMES PASS, of the well-known firm of Pass & Seymour, Syracuse, N. Y., died at his home in that city Oct. 30, 1913, at the age of fifty-seven. Mr. Pass was born in Burslem, Staffordshire, England, June 1, 1856, and came to the United States with his parents when seven years of age. His father, Richard Pass, was a manufacturer of pottery and first settled in Cincinnati, later in Trenton and finally in Syracuse. His son, James, was apprenticed to a pottery manufacturer in Trenton, and when he came to Syracuse at the age of eighteen was made foreman in the Onondaga pottery. He afterward succeeded his father as superintendent of the pottery, soon became general manager and later vice-president of the works. In 1890, with Mr. Seymour, Mr. Pass formed the firm of Pass & Seymour, manufacturers of porcelain insulation, etc. Mr. Pass was at one time president of the United States Potters' Association and was a charter member of the American Ceramic Society. He was also a member of the Engineers' Club of New York, the Syracuse section of the American Chemical Society and the Century, Citizens' and Country Clubs of Syracuse. He is survived hy his widow, two sons and a daughter.

L. N. PEART, general superintendent and J. E. BURGESS, construction superintendent, of the San Joaquin Light & Power Company, of Fresno, Cal., were drowned in the San Joaquin River on March 28th, when the automobile in which both were riding slid from the Crane Valley bridge. Mr. Burgess, whose body was recovered on March 31st, was a graduate of the University of California and was twenty-six years old. Prior to his connection with the San Joaquin Light & Power Company he was engaged in business in Los Angeles. He was a native of Michigan.

CHARLES F. PRICHARD, vice-president and general manager of the Lynn (Mass.) Gas & Electric Company and treasurer of the Gloucester (Mass.) Electric Company, died suddenly at his home in Lynn on Jan. 19th. Mr. Prichard was one of the most noted gas experts in America, and was prominent in public utility affairs in the East, being a director of the Beverly (Mass.) Gas & Electric Company and prominent in affairs of the Massachusetts Electric Lighting Association. He was a native of Marblehead, Mass., and was educated at the Massachusetts Institute of Technology. In 1883, at the age of twenty-seven, he was made superintendent of the Lynn company, becoming general manager in 1901 and vice-president in 1908.

HENRY M. RICHARDS, chairman of the Executive Committee of the board of trustees of the Westinghouse Water Power Company, Spokane, Wash., and vice-president of the Spokane & Eastern Trust Company, who was hurt in a runaway accident Nov. 9th, at Springdale, Wash., died in the hospital on November 16, 1913. He was born March 16, 1849, in New York, was educated at Mount Washington Collegiate Institute and at an early age became a clerk with John P. Moore's Sons, importers and manufacturers of firearms, etc., later a salesman, and then a member of the firm. He remained actively with that firm from 1863 to 1886, when he retired from business in New York and removed to Warren, Ohio. There he remained until 1893, when he removed to Spokane, Wash., where he, with his brother, Mr. J. P. M. Richards, organized the Spokane and Eastern Trust Company. He became its vice-president, and shortly afterward he also became president of the Washington Water Power Company, which position he held from 1895 until 1910, when he became chairman of the executive committee of its board, the position he held at the time of his death. The phenomenal success of the Washington Water Power Company is largely due to the efforts of Mr. Richards. During the troublesome times following the panic of 1893 he succeeded in turning the tide of adversity by interesting Eastern capital. He became connected with the company first in 1894 as a trustee. He was elected president shortly afterward, and more than any other man was individually responsible for the friendly reorganization of the company's financial affairs, whereby the investors of the various securities of the company were saved from loss and the various sub-companies of the Washington Water Power Company were united into a concrete whole. When Mr. Richards became president of the company it had a capital of $1,500,000, and its bonded indebtedness was $1,637,000. Today the capitalization is $20,000,000. The bonded indebtedness is now $5,000,000. Its gross revenues have grown from $200,000 to $3,000,000. During Mr. Richards' administration the greater part of the power at Spokane has been developed, all of that at Post Falls, Idaho, and Little Falls, Wash., and the big work undertaken at Long Lake, Wash. When he became president the company was not operating outside of the limits of the city of Spokane, while today its lines extend nearly to the Montana line on the east and more than 100 miles to the west and south of Spokane.

Francis H. Soden, one of the pioneer electrical men of Chicago and an employee of Edison in the early days of electric lighting invention at Menlo Park, died at his home in Chicago on Feb. 14th. Mr. Soden was born in Newark, N. J., fifty-five years ago and in his young manhood, following his work with Mr. Edison, he was one of those engaged in the electrical work on the old Pearl Street station in New York City. About 1881 young Soden was sent west for the Edison Electric lighting interests.

He installed his first electric-lighting plant in Stillwater, Minnesota, and was also electrical constructor for the famous Appleton (Wis.) plant, the first Edison central station in the world. Soon after this he went to Chicago, where he lived for the rest of his life. He was associated with the late George H. Bliss, and also with the Western Edison Electric Light Company, and for about five years was engaged in the installation of isolated electric lighting plants in Chicago. Mr. Soden installed the first electric lighting equipment in a Chicago theater at the old Academy of Music. About 1887 he accepted a position with the Chicago office of the Thomson-Houston Electric Company where he was engineer of the lighting department. In 1891 Mr. Soden was one of the five electrical men recommended by the Chicago Electric Club of that day for appointment as electrical adviser to Mr. D. H. Burnham, chief of construction for the World's Columbian Exposition. For a time Mr. Soden was engaged in business for himself as an engineer and contractor. He possessed much inventive ability and perfected a number of switching and other electrical devices. He is credited with inventing the flexible electric heating pad for his own use while ill with pleurisy. He also developed apparatus for electrically melting ice in frozen water and gas pipes. He was handicapped for long periods by sickness, but with it all he maintained an indomitable spirit and a constant cheerfulness that endeared him to his friends. For a time he was associated with John A. Markle in street-railway enterprises. Of late he had been employed by the Middle West Utilities Company in charge of the electrical exhibition car "Electra." He returned from a trip last December, and while the car was laid up for the winter he joined the forces of the Electric Shop of Chicago during the holiday rush. Although Mr. Soden had been in failing health death was quite sudden. He is survived by a wife, three daughters, and a brother, John K. Soden, of the city electrical department of Portland, Ore.

GRAFTON STEVENS, of Chicago, by profession a mechanical engineer and vice-president of the Oelwein (Ia.) Light, Heat and Power Company, was burned to death with his wife, in their suburban home at Wilmette on Oct. 31, 1913. Mr. Stevens was graduated from the Armour Institute of Technology in 1903 and went with H. M. Byllesby & Company as an assistant to Mr. H. B. Brydon, of the engineering department, in 1907. He was greatly liked by his employees and associates. He resigned from the Byllesby organization in April of this year and opened an office in Chicago for himself as a manager of utility properties, acquiring an interest in the Oelwein plant. Mr. Stevens was a member of the American Society of Mechanical Engineers, the Phi Kappa fraternity, the Hamilton Club of Chicago and other clubs.

REUBEN CLARK WINCHESTER, treasurer of the Holyoke (Mass.) Water Power Company, died at his home in Holyoke on Sept. 11th after a short illness. He was born in Marlboro, Vt., fifty-six years ago, and after being educated at Holyoke and New York entered the professional baseball field for a short time, where he was highly successful among the earlier players of the national game. In the winters of 1878 and 1879 he was employed by the Holyoke Water Power Company as a collector, becoming permanently attached to the staff in 1880 and passing through the positions of paymaster and cashier to the treasurership, which he attained in 1903. The Holyoke Water Power Company supplies hydroelectric energy to many of the large mills of Holyoke, and Mr. Winchester's broad interests and diplomatic qualifications rendered him a leader in industrial affairs in the Upper Connecticut Valley. He is survived by a daughter.

JAMES R. WILEY, of Chicago, Western manager of the Standard Underground Cable Company, died of pneumonia in the Washington Park Hospital, Chicago, Aug. 17, 1913. He was one of the most popular and best known of the electrical men of Chicago and was also one of the telephone pioneers. He was born in Newark, Mo., May 1, 1847, and spent his early manhood in St. Louis, graduating from the St. Louis City University. He engaged in mercantile and banking pursuits and became an expert accountant. In 1878 he entered the service of the Metropolitan Telephone and Telegraph Company of New York City and remained with that company and its successors until 1895, when he became affiliated with the Standard Underground Cable Company and removed to Chicago as Western Manager, a position he filled until the time of his death. In his eighteen years' residence in Chicago Mr. Wiley acquired a wide acquaintance among electrical men. The deceased was unmarried. He was a member of the Jovian order and of the Chicago Association of Commerce. He is survived by three brothers and two sisters. One brother, Mr. George L. Wiley, is eastern manager of the Standard Underground Cable Company at New York.

George Westinghouse was born at Central Bridge, N. Y., Oct. 6, 1846. His parents were George and Emeline Vedder Westinghouse. Mr. Westinghouse's father was an inventor also and in 1856 removed with his family to Schenectady, N. Y., where he established the Schenectady Agricultural Works. George Westinghouse was one of five sons, only one of whom, Herman H. Westinghouse, is now living. The boy attended the public schools of the town and spent his leisure moments in his father's machine shop. Before he was fifteen years he invented and built a rotary engine. In June, 1863, although not seventeen, young Westinghouse enlisted in the Twelfth New York National Guard and shortly after joined the Sixteenth New York Cavalry. He was honorably discharged in November of the following year and a month later accepted an appointment as third assistant engineer in the United States Navy. At the close of the civil war Mr. Westinghouse entered Union College, where he remained until the end of his sophomore year, leaving to enter upon active life and to find a wider scope for his inventive genius. In 1865 he invented a device for replacing railroad cars on the track, which was manufactured by the Bessemer Steel Works in Troy, N. Y. His first patent for an air brake was awarded a few years after, on April 13, 1869, and the Westinghouse Air Brake Company was formed on July 20th of that year. He invented the automatic feature of the brake and in 1886 was awarded a patent for a quick-action brake. In 1863 Mr. Westinghouse became interested in the operation of railway signals and switches by compressed air and developed and patented the system now manufactured by the Union Switch & Signal Company. In 1886 the Westinghouse Electric Company was formed for the manufacture of lamps and electric lighting apparatus, Mr. Westinghouse having become interested in the subject. The business rapidly developed and in 1889 and 1890 the company absorbed the United States Electric Lighting Company and the Consolidated Electric Light Company. In 1891 all these properties were reorganized into the Westinghouse Electric & Manufacturing Company, which owns extensive works in East Pittsburgh, Pa. While the company was still growing Mr. Westinghouse had the foresight to gather about him such able engineers and inventors as William

Stanley, Nikola Tesla, O. B. Shallenberger and others in the development of alternating-current machinery. Mr. Westinghouse rendered an invaluable service to the industry when in spite of strong opposition he succeeded in introducing the alternating-current system of distribution. The direct-current system was then used exclusively in this country. In 1885 Mr. Westinghouse sent the late Franklin Pope, then on the consulting staff of the Westinghouse company, to England to purchase the American rights to the invention of Messrs. Goulard and Gibbs, two British electricians who experimented with crude apparatus for alternating current. Within a month after Mr. Pope's return Mr. Westinghouse had set up a laboratory to develop the Goulard-Gibbs invention commercially. From that moment the real modern application of electricity to lighting, manufacturing and transportation may be said to date. He backed Tesla financially and with shop facilities in developing the induction motor, and built the first great dynamos for Niagara Falls. The alternating current made possible long-distance transmission of energy and the development of hydroelectric power far remote from the point of its utilization. Almost akin to his work for electric transmission of energy was his system for controlling natural gas and conveying it through pipe lines for long distances, thereby establishing the practicability of utilizing natural gas as fuel in homes, mills and factories. Mr. Westinghouse also took a foremost part in the development of gas engines and in adapting steam turbines to electric driving. Besides his genius as an inventor, Mr. Westinghouse was well known as an organizer and financier. The Sawyer-Man incandescent lamp, the Nernst lamp and the Cooper-Hewitt mercury vapor lamp were all put on a commercial basis by him. To Mr. Westinghouse was given the honorary degree of Doctor of Philosophy by Union College in 1890, and in 1906 the Konigliche Terhnische Hochschule of Berlin bestowed upon him the degree of Doctor of Engineering. His decorations comprised the Legion of Honor of France, Royal Crown of Italy, and Leopold of Belgium. He was the second recipient of the John Fritz medal and was awarded the Edison medal by the American Institute of Electrical Engineers in 1912. On behalf of the engineering profession of Germany the American Society of Mechanical Engineers presented him with the Grashof Medal last December. Mr. Westinghouse was an honorary member of the American Society of Mechanical Engineers, of which he was also a past president, the National Electric Light Association and the American Association for the Advancement of Science. He was president of a large number of corporations having an aggregate capital of over $100,000,000 the largest of which are the Westinghouse Air Brake Company, the Westinghouse Machine Company and the Union Switch & Signal Company. He was also the head of about a dozen companies abroad, the largest of which are in London, Manchester and Havre. Mr. Westinghouse was married Aug.. 6, 1867, in Brooklyn, N. Y., to Marguerite Erskine Walker, who with one son, George Westinghouse, Jr., survives him.

President McCall: Gentlemen, you have heard the report of the Committee on Memorials. The resolutions as prepared by the Secretary will be placed in the Proceedings, and wherever necessary, suitably inscribed. I will ask for a rising vote in the adoption of this Report of the Committee on Memorials. (The report was adopted by a rising vote.)

The next business in order is the consideration of the Report of the Committee on Constitutional Amendments, Mr. F. W Frueauff, of New York City, Chairman. I regret very much that Mr. Frueauff is detained in New York.

This report was laid before the Convention in Executive Session Wednesday by Mr. Holton H. Scott. It is now before you for action. I think, possibly, it is due the meeting that some explanation, if it has not already been given you, should be made. The change making the Treasurer an elective office is simply to arrange to give him a vote on the Executive Committee. At the present time it is an appointive office, and the Treasurer has no voice in the management of the affairs of the Association.

As to the amendment proposed under Article VII, Section 1, the change contemplates an increase in the dues of all Member Companies in cities of over 25,000, from 1/100 of one per cent to 1/50 of one per cent. That means the doubling of the present dues, and my observation is that the industry can very well afford to do it. Each succeeding year, according to the reports and from my recollections of the conventions the President of the organization makes some request or some recommendation for additional revenue for the work of the Association. I have found during the past year, with a little more intimate knowledge of the workings and the finances of the Association, that it is absolutely impossible for us to continue to do the necessary work, or to go forward and do the things which will become necessary, without having right at our hands some means that will enable us to do business, without first going around hat in hand, or depending upon a very few of the larger companies to bear an undue proportion of the expense. Every man who goes into a church should pay for his sitting.

You will notice that the proposed Amendment to Article VII, Section 4, regarding the Class D members provides rather an elastic situation. It was found very difficult to arrange a schedule that would satisfactorily take care of the different classes of manufacturers, from the very largest to the smallest, and the Society for Electrical Development in a way got ahead of us on it, so that we could not well adopt their plan. It is ridiculous, when you stop to think of it, that the dues of the manufacturers who are connected with this organization amounted last year to only $5,000. Every manufacturer, from the General Electric Company down, pays $20 a year for his membership in the organization and the expert advice and assistance which he gets from the efforts of the operating men in the course of the work done by the Association.

In an endeavor to fix some kind of standard, I saw Mr. Rice and Mr. Burchard of the General Electric Company, knowing that that company has always very generously supported every movement in which the industry was concerned, and I got them to agree that their fee should be, at least, $2,500. (Applause) I felt as if I had not urged the matter far enough, when I got the $2,500. (Laughter) However, the idea of fixing that $2,500 was to start at the top and make a rate from that down, without doing injustice to any one. If a firm can pay only $20, because of the condition of its business, it is entitled to membership in the Association on the payment of that amount. As I say, every one should pay for his sitting.

Talking a little intimately of the situation as well, and for the information of the members, which I think they ought to have, I discovered in connection with the financing of the organization, that 50 per cent of the revenue which enabled us to proceed with its work—to advocate or combat, to act both on the defensive and offensive, in connection with all the theories which are brought up—that 50 per cent of the revenue is paid by the employees of the industry.

As I stated in my annual address, I feel that that branch of the industry should not have to pay too much. Employees ought to be in a position of absolute independence, and they therefore should pay but a nominal fee; and the amendment provides that members in Class E shall pay $5 a year, including membership in a Geographic Section and in a National Special Section, and that these members shall receive without cost such publications as shall be approved and authorized by the Executive Committee, including the Commercial Hand-Book and books of that character, without an aditional fee. I think that is only right. Those concerned in the industry, the manufacturers and operators, who get the benefit, should pay practically the greatest portion of the amount required to support the theories in which we believe.

I had not intended to talk about this; I expected Mr. Frueauff to do it. I feel, however, that you should know the conditions as they exist, and I ask you to pass these amendments.

(The amendments were then put to vote and unanimously carried.)

PRESIDENT McCALL: The next business will be the Report of the Committee on Resolutions, of which Committee Mr. John F. Gilchrist is Chairman. In his absence, Mr. Martin, a co-member of the Committee, will read the Report.

REPORT OF THE COMMITTEE ON RESOLUTIONS

Whereas, The arrangements for special trains to the convention from different parts of the country have been made with great executive ability and carried out with general satisfaction, ensuring the comfort and convenience of delegates from distant points, it is hereby

Resolved, That the thanks of the Association be tendered to Mr. George W. Elliott, Master of Transportation, and to the other members of his committee for organizing and handling these trains.

Whereas, The manufacturers and their representatives in the Philadelphia district have been profuse in their hospitality and entertainment and have contributed largely to the success of the convention, increasing the number of its pleasurable incidents,

Resolved, That the thanks of the Association are hereby tendered to these various firms and individuals for their generosity.

Whereas, The technical press has ever been a cordial supporter of the Association and an intelligent exponent of its aims and ideals, and has this year given unusual publicity to the work of the convention, it is

Resolved, That our thanks be tendered to the technical press as a whole, and particularly to the McGraw Publishing Company for its contribution of the *Convention Daily,* whose staff under the direction of Messrs. W. E. Keily and W. H. Onken, editors in chief of the *Daily,* has given a remarkably full, accurate and vivid record of the proceedings in its four consecutive issues.

PRESIDENT McCALL: I have never known such publicity to be extended to a convention of the Association before and this resolution of thanks to the local press should be passed separately.

(The resolution was put to a vote and carried.)

Whereas, The daily press of the City of Franklin, father of journalism in the United States, has been unusually cordial and appreciative in its treatment of the Association and its convention and has been most generous in the space accorded to its work and play, it is

Resolved, That the thanks of the Association be most heartily accorded to the newspapers of Philadelphia for such an appreciative welcome, which it is believed typifies the real sentiments of the public at large toward a public utility organization aiming to promote methods and principles for giving the public all the incalculable benefits of the great modern industry of electric light and power, and,

Resolved, That a copy of this resolution be sent to each of the morning and evening papers of the city.

Whereas, The Westinghouse Electric and Manufacturing Company has this year added to the gift made some years ago of a permanent base-ball trophy, by adding this year silver cups to be given individually to the members of the winning team in the annual base-ball game.

Resolved, That the thanks of the Association be given to the Company for this further evidence of its interest in the welfare of the Association and in the amusement of the member company employees.

Whereas, Unusual facilities have been extended to the Association by the main line railroads entering the city of Philadelphia in connection with special arrangements for the comfort and welfare of incoming delegates,

Resolved, That the thanks of the Association be extended to such railroads for this courtesy.

Whereas, In connection with the work of the Association special courtesies and facilities have been extended by the city officials to the Association and its local member companies, especially in the arrangement for and the erection of the triumphal arch on Broad Street, it is,

Resolved, That the thanks of the Association be extended to the City departments, their officials and employees for the courtesies thus extended.

Whereas, The hotels of the city of Philadelphia have in various ways shown, with the citizens at large, their desire to make the delegates comfortable and at home, it is

Resolved, That the thanks of the Association be tendered to those admirable hotels for the many courtesies and facilities thus enjoyed, and particularly to the Bellevue-Stratford, wherein for the first time in many years all of the functions connected with the convention, meetings, exhibition, offices and various entertainments have been concentrated within and under the one roof.

Whereas, The University of Pennsylvania has been especially generous in its courtesies, in the extention of the privileges of Franklin Field for the base-ball game, in the services of its student band at that time, and in opening up its halls and museums for inspection,

Resolved, That the thanks of the Association be extended to the University in the hope that with it and with other seats of learning the relations of the Association may be made closer, more friendly and more useful in years to come.

President McCall: I would like to have this resolution of thanks to the University of Pennsylvania passed separately.

(The resolution was put to vote and carried.)

Whereas, The General Convention Committee by its unwearied, incessant and devoted efforts, with infinite and careful planning and intelligent shaping and adjusting of all the features, has given the Association on its return to Philadelphia after twenty-seven years absence a convention which has never been excelled, and perhaps never equalled in the history of the body, it is

Resolved, That unbounded thanks and praise be given to the General Convention Committee for its splendid work in all these respects, with special tribute to past-president W. C. L. Eglin, Chairman and guiding spirit.

Whereas, The Philadelphia Electric Company, setting an example to member companies by the notable efficiency with which it serves the great community whose name it bears, has on this occasion welcomed with open hands and arms thousands of delegates from all over the country and has made everyone feel the reality of the comradeship and essential unity for which the Association stands,

Resolved, That the thanks, profuse and unbounded, of the Association, be extended to the company for all that this large gathering has enjoyed from it, and that in this connection the Association take the opportunity to record its signal appreciation of the work its president, Joseph B. McCall, President of the Company, his colleagues, Messrs. Walter H. Johnson and W. C. L. Eglin, and its whole staff, including every member of the Company Section, one of the largest within the organization.

Whereas, Thirty years ago the Franklin Institute with courage and foresight organized the first International Electrical

Exhibition and the first International Electrical Congress in this country, thereby giving enormous stimulus to the electrical sciences and,

Whereas, At this convention it has co-operated to signalize this thirtieth anniversary,

Resolved, That the thanks of the Association be tendered to the Institute for its brilliant co-operation, for the loan and exhibition at the Public Policy meeting of precious Franklin relics, and,

Resolved, That the thanks of the Association be most warmly extended to the Institute, to President Walton Clark and to Dr. R. B. Owens, Secretary.

PRESIDENT McCALL: I would like this resolution of thanks adopted separately. (The motion was put to vote and carried.)

Whereas, In connection with the convention and the celebration of the thirtieth anniversary of the first International Electrical Exhibition and the first International Electrical Congress, the Association has enjoyed the privilege and honor of the presence of some of the great pioneers of the industry, and those who have contributed in various distinguished ways to universalize electric service to mankind,

Resolved, That the thanks of the Association be given to Thomas A. Edison, Charles F. Brush, Frank J. Sprague, and E. W. Rice, for their participation in the Thirty-seventh Convention.

Whereas, The Exhibition Committee has in the Roof Garden of the Bellevue-Stratford Hotel, given the most complete and artistic display of modern up-to-date apparatus and supplies that the Association has ever known in its history,

Resolved, That the hearty thanks of the Association be conveyed to the Committee through its Chairman, James I. Ayer, past president of N. E. L. A., its Secretary, H. G. McConnaughy, and the other members of the Committee for the unique service thus rendered to the central station industry by evidencing to the members and to the public at large that electricity makes not only for utility but for beauty.

Whereas, As evidenced by the address of the President and the reports presented by the Secretary, the Treasurer and the Editor of the Question Box, the work of the Association has undergone considerable increase during the year and has exhibited a higher economy and efficiency, it is

Resolved, That a hearty vote of thanks and an expression of appreciation be tendered to the secretary and his staff for the loyalty, intelligence and success with which its affairs have been administered.

PRESIDENT McCALL: I would like to have a special motion on that resolution. I do it to call particular attention to Mr. Martin's modesty as well as his ability.

(The motion was put to vote and adopted.)

Whereas, It is the belief of the Association that a very large part of its useful work is performed through the Company Sections and,

Whereas, Past-president Doherty, past-president Williams and vice-president Scott have generously contributed prizes to stimulate and develop interest in Company Section work by Class B members,

Resolved, That the thanks of the Association be extended to these gentlemn for this encouragement of the Company Section policy which has been so prominent a feature of Association work during the past few years.

Whereas, The annual base-ball game has this year been devoted to the preliminary and final contest and,

Whereas, The event has been made more interesting by special gifts and contributions,

Resolved, That the thanks of the Association be hereby conveyed to Herbert A. Wagner, Esq., for the gift of a special silver cup, and to the New York Edison Company, the Consolidated Gas, Electric Light and Power Company of Baltimore and the Philadelphia Electric Company for enabling their teams to be present to take part in this interesting contest.

Whereas, The Honorable Rudolph Blankenburg, Mayor of the City, in a most notable address of welcome at the opening of the convention enlarged upon the duties and relationships of the modern public utility and outlined with eloquence the conditions under which such utilities exist and do service in their respective communities,

Resolved, That the most cordial thanks of the Association be tendered to his Honor for this incisive and cordial treatment of the subject, which outlined so expressively and trenchantly the standard the Association has set before itself these many years in collective effort to promote the highest ideals among the membership for public welfare.

PRESIDENT McCALL: The promise of his Honor, the Mayor, to attend this Convention, was made about a year ago, and during the entire year which has elapsed he has shown constant interest in the fact that this Association was going to meet in Philadelphia. He came here on the opening day, notwithstanding a slight illness and many onerous duties, to extend the welcome of the City to us. I ask that a special vote be taken passing this resolution.

(The motion was put to vote and carried.)

Whereas, The affairs of the Association during the year have been conducted by the Executive officers of the Association most ably and effectively, as shown by prosperity and advance in every department of its work,

Resolved, That a full and most hearty vote of thanks be tendered to President McCall and the Executive Committee for devotion to its interests, as well as to the various standing and special committees, without whose laborious and conscientious work, exhibited in reports and publications, its affairs could not be carried on.

Whereas, The Thirty-seventh Convention has been signalized by two remarkably complete publications, the new Overhead Line Construction Handbook and the new Salesman's Handbook, either of which would confer distinction upon any convention,

Resolved, That the hearty thanks of the Association be extended to Mr. Thomas Sproule, Chairman of the Overhead Line Construction Committee and his associates, and to Mr. Charles J. Russell and his colleagues, for their special work in the compilation of these books, both publications being of notable standard and permanent value.

MR. W. H. JOHNSON, Chester, Pa.: I move that the report of the Committee on Resolutions, as a whole, be adopted.

(Motion put to vote and carried.)

PRESIDENT McCALL: The very proper vote of thanks was passed to Mr. Sproule, Chairman of the Overhead Line Construction Committee for the compilation of the new Overhead Construction Handbook, and while we are on that subject I would like to call upon Mr. Spencer to introduce a resolution confirming certain action taken at the Technical Session approving the Hand-Book and the Specifications. Inasmuch as the various interests are reconciled, and the book, so far as I know, has no limitations of any character whatever, and covers fully the conditions throughout the entire country, I think it would be in order to have a resolution presented that the book be adopted as the sense of the Executive Session.

MR. PAUL SPENCER, Philadelphia, Pa.: The following resolutions were adopted at the Technical Session of Thursday afternoon. As they modify the action of this Association previously taken, and very materially affect the interests of all member companies, we ask for their approval by the member companies in Executive Session. The first resolution is as follows:

The Committee on Overhead Line Construction recommends that the approval of Section 3 of the 1911 report be rescinded, and that Section 4 of the report be changed to read as follows:

1 *Scope* These specifications shall apply to overhead electric light or power line crossings (except trolley contact wires), over railroad right-of-way, tracks, or lines of wire.

PRESIDENT McCALL: The resolution is before you, gentlemen. (On motion, the resolution was duly adopted.)

MR. SPENCER: Mr. President the following resolution was also adopted, and I would like to present it for adoption here:

Resolved, That the National Electric Light Association, as an Association, believes that no specification for the joint occupancy of pole lines having a voltage limitation feature, by inference or otherwise, should be approved or adopted as its standard.

(On motion, the resolution was adopted.)

PRESIDENT McCALL: We will now have the report from the Auditor, who has gone over the Treasurer's accounts.

SECRETARY MARTIN: I will read the following report:

JUNE 4, 1914.

Auditing Committee of the
National Electric Light Association

GENTLEMEN: I have made an examination of the financial report of your Association for the year 1913 and hereby certify that this report is in accordance with the books of accounts kept at the Association's headquarters. In the course of my examination I verified the cash receipts and disbursements, also the cash balance on hand at the close of the fiscal year with the bank statement.

Yours truly,

FREDERICK SCHMITT,
Secretary Accounting Committee.

President McCall: I do not think any action is required on this report of the Auditor, except to receive it.

I would like to have the Secretary read the report from Mr. George W. Elliott, in connection with next year's convention. I think action was taken at the Seattle Convention, and subsequently at a meeting of the Executive Committee, that the Convention for 1915 was to be held in the City of San Francisco, not only because of the Exposition being held there, but because we thought it was a good place to go to.

I very much regret, in that connection, that the business duties of Mr. Britton prevent him from remaining on the Executive Committee or holding any official position in the organization. He has not lost interest in the Association, however, of that I am quite certain from my own visit to San Francisco—many of you will recall our visit there on the way to Seattle—and I am sure that we may expect the best possible treatment of the visiting delegates when we hold our convention in San Francisco next year.

There has been some question on the part of various members of the Association as to the ability of San Francisco to take care of the housing of the delegates, as to whether there will be hotel accommodations ample for that purpose. Those who have had to do with convention arrangements know that this is an important point to bear in mind. Mr. Britton has sent two representatives to this meeting, Mr. Varney and Mr. Lisberger, who assure us that San Francisco will be able to take care of us in satisfactory manner.

Secretary Martin: I have the following report:

REPORT OF THE SAN FRANCISCO HOTEL SITUATION

I beg to report, after conference with Mr. S. J. Lisberger and Mr. F. H. Varney, representatives from San Francisco, regarding hotel reservations for the 1915 convention of the National Electric Light Association, that one hundred (100) rooms each have been secured at the St. Francis, Palace and Fairmount Hotels for the week beginning June 6, 1915, making a total of three hundred (300) rooms at these three leading hotels, and assurances have also been given that as many additional rooms as desired may be secured at the various other hotels in San Francisco and arrangements to this end should be made at once by the 1915 Hotel Committee for these accommodations. Messrs. Lisberger and Varney have been untiring in their efforts to clear up the hotel situation and secure the accommodations which were necessary at the leading hotels.

Respectfully submitted,

George W. Elliott.

President McCall: Ordinarily, it would not be necessary to take any action on this report, the Association having decided, through its Executive Committee at least, that the convention shall be held in San Francisco; but there has been doubt in the minds of some of the members as to whether or not the convention is actually to be held in San Francisco in 1915, and I would ask at this time that a motion be made that the convention be held in San Francisco during the early part of June, 1915, and also that a vote of thanks be extended to Mr. Britton and his associates for their efforts in bringing about the necessary hotel arrangements.

Mr. Johnson: I move that a vote of thanks be extended to Mr. Britton and his associates for the arrangements which they have made in connection with hotel accommodations at San Francisco for our convention in 1915. (Motion seconded and carried.)

President McCall: While not on the program, it is customary for a Committee to report on the address of the President, and I will ask Mr. Frank Tait, of Dayton, Ohio, to present the Report.

REPORT OF COMMITTEE ON THE PRESIDENT'S ADDRESS

Your Committee appointed to review and report on the President's address, delivered at the opening of this Convention, recommends for the careful consideration of our membership the President's comprehensive review of the Association's activities during the past year and his suggestions for the future welfare of the great industry represented by this Association. Particular attention is directed to the matter of a better financial plan for the Association for the future and urged by President McCall, and the fact that for several years, succeeding presidents have learned from experience and recommended to the Conventions that something should be done to provide adequate financial support for the Association if its work is to reach the highest plane for the general good. This matter has been crystalized, to some extent, by your action approving changes in the rating of dues in the several classes and is a matter that has been of deep interest to President McCall, who has now brought it to a focus.

The Committee recommends that President McCall's address be promptly placed in the hands of the entire membership of the Association either by publication in the Bulletin or in any other suitable way.

Respectfully submitted,

C. L. EDGAR, *Chairman*
J. F. GILCHRIST
F. M. TAIT

MR. ARTHUR WILLIAMS, New York City: I would move that the recommendations of the Committee be carried out. (Motion put and carried.)

REMARKS OF RETIRING PRESIDENT McCALL

Before asking for the Report of the Committee on Nominations let me say that while it is not necessary for me to add anything to the resolutions which have been prepared by the Committee on Resolutions, I do not want to retire from this office without expressing personally to the members of the Public Policy Committee and the various other Committees, and to the members of the organization in general, my thanks for their very hearty and splendid, loyal support of my administration during the past year. I realize, as all of you must, that without that kind of an organization it is not possible for anything to succeed.

I cannot say anything more in regard to it, except that I want to be pardoned if just for the moment I refer with some little pride to the efforts of the organization of the Philadelphia Electric Company in their convention planning and in their active work of bringing about a very successful and a very notable convention.

I have been pleased, especially, with the wonderful attention which has been given to all of the business meetings. It is evidence of the fact that when the administration takes into consideration the desire of the members for broader discussion and fewer papers—live, up-to-date ones—the members are ready to respond; and where discussion is properly prepared, as some one has said, by "the fire of such intellectual contact you will hammer out the truth." We recognized the desire on the part of our members, and as the result of our experience at this meeting, I hope that at succeeding conventions, which are difficult to handle when one considers the size of them, the practice will be to continue to eliminate where possible, the less useful things from consideration and discussion, and take the greater things with the fuller discussion thus made possible, for the benefit of the industry.

I want to thank you again, and to assure you of my great appreciation of your support during the past year. (Applause)

The next business before the meeting is the Report of the Committee on Nominations, Mr. F. M. Tait, Chairman.

REPORT OF THE COMMITTEE ON NOMINATIONS

MR. CHAIRMAN: The Nominating Committee begs to submit the following recommendations for the ensuing year:

H. H. Scott (New York), President.
E. W. Lloyd (Chicago), Vice-President.
H. A. Wagner (Baltimore), Vice-President.
L. D. Gibbs (Boston), Vice-President.
J. S. Bleecker (Columbus), Vice-President.
W. F. Wells (Brooklyn), Treasurer.

Members of Executive Committee to serve three years:

Paul Spencer (Philadelphia).
A. C. Einstein (St. Louis).
Walter Neumuller (New York).

Recommended to the Executive Committee for reappointment as Secretary:

T. C. Martin (New York City).

Respectfully submitted,

F M TAIT, *Chairman*
W H JOHNSON
F W FRUEAUFF
J L BAILEY
JOHN F GILCHRIST

PRESIDENT McCALL: Gentlemen, the Report of the Committee on Nominations is before you.

MR. JOHNSON: I move that the Secretary be authorized to cast one ballot for the nominees named by the Committee on Nominations for the respective offices.

(Motion seconded and carried.)

SECRETARY MARTIN: I cast the ballot as instructed.

PRESIDENT McCALL: The Secretary casts the ballot, and the gentlemen nominated by the Committee on Nominations are duly elected for the ensuing year to the respective offices indicated.

I would be glad to have Messrs. Eglin and Williams form a Committee to escort the incoming president to the platform.

(Messrs. Eglin and Williams escorted president-elect Scott to the platform.)

PRESIDENT McCALL: It gives me great pleasure, Mr. Scott, to pin on you the insignia of office as President of this Association. Almost any man can be elected President of his club or fraternity. But I can tell you, sir, to be chosen as the head of your industry is a real honor. I ask for Mr. Scott the same support during the coming year that I have had in the past. (Applause)

MR. HOLTON H. SCOTT: Fellow members, I thank you most heartily for your cordial action. I think this convention has been the banner convention. It will be hard to equal. I have been impressed, as you all have been, with the way we have been looked after in the matter of our accommodations. The social arrangements have been excellent, and as our President has said, the business meetings have been far above the ordinary. The attendance has been large, the percentage of attendance has been greater than at any other convention, and the historical feature in connection with the convention will not soon be forgotten.

But there is another thing, Mr. President and fellow members, that has impressed me very much, and that is the attendance of the past-presidents of the Association at this meeting. I want to call attention to the fact that of twenty-six living ex-presidents, fifteen are at this meeting. (Applause)

Starting with the president of last year, the following ex-presidents have been here, going back from 1913 to 1900: Messrs. Tait, Gilchrist, Freeman, Frueauff, Eglin, Farrand, Williams, Blood, Davis, Edgar and Ferguson. I can say that Mr. Doherty, whose name should be among this list, regretted very much that he was unable to attend. Prior to 1900, the following named ex-presidents have been at the meeting: Messrs. Insull, Nichols, Armstrong, Ayer and Huntley. Mr. President, it seems to me this means that you, and I to follow, are enrolled for all time with this Association. It seems that the interests of the past officers are always with the Association.

I am familiar to a certain extent only with the duties of the president of this Association. I know it is a hard position, in fact, Mr. Insull told me so last night; but with the co-operation of my fellow members, with the help of the staff, and under the guidance and direction of our able Executive Committee and the counsel and advice of the past-president, I pledge you my best efforts to uphold the high principles of the Association. (Applause)

PRESIDENT McCALL: Is there any further business before the Convention?

MR. EGLIN: I probably should have made this motion very much earlier in the Convention. I would like before we adjourn to introduce the following resolution:

Resolved, That the Thirty-seventh Convention extend its heartiest greetings to Miss Billings in appreciation of her activities in the past, with best wishes for continued good health and enjoyment of her well earned rest in Vermont.

MR. WILLIAMS: It is curious that Mr. Eglin and I, who both have the honor of wearing the gold decoration of this Association, seem to have been impelled by the same thought at the same time, only I was a half minute late; but not having had the pleasure of moving this message of hearty good will and appreciation, and of a desire for the continued health of Miss Billings, I should like to have the honor of seconding the motion. (Motion put to vote and carried.)

THE PRESIDENT: Is there any further business to come before the Convention? If not, the meeting will now stand adjourned.

(Adjourned *sine die*)

PRESIDENT McCALL

The President of the Association for 1913-14, Mr. J. B. McCall, of the Philadelphia Electric Company, has been active for many years in N. E. L. A. affairs, giving them an unlimited amount of time and attention as an officer and as member of various committees.

For nearly twenty years Mr. McCall has been one of the conspicuous figures in the development of the electric light and power facilities of the city of Philadelphia and its suburbs. His interest in the electrical industry has always been practical and constructive, and his ability has been demonstrated by the success he has achieved both as organizer and as executive. As president of the Philadelphia Electric Co. from its inception, he has concentrated his energies upon the strengthening of this organization and the expansion of its field of operation, and largely as the result of his efforts it has become one of the most important utility corporations in the country.

Joseph Benton McCall was born in New York City, May 12, 1870. In childhood he was taken by his parents to Philadelphia, and in the public schools of that city he received his education. His first employment was in the office of Rufus E. Shapley, of Philadelphia, with whom he took a position in 1885. During the year he remained in that office he read law and took up the study of stenography. At the age of sixteen he began work for the Pennsylvania Globe Gas Light Co., and by the intelligent and efficient discharge of his duties gained successive promotions, being finally chosen secretary of the company. In 1895 he was one of the organizers of the Pennsylvania Heat, Light & Power Co., of which he became secretary and treasurer. In 1898 that company was absorbed by the Pennsylvania Manufacturing Light & Power Co., and Mr. McCall was chosen president of the new organization. When during the following year it was absorbed by the Philadelphia Electric Co., he was made president of the latter corporation, in which office he has continued to serve. Since assuming the duties of the executive head of the company he has given practically his whole time to the furthering of its interests, to do which he has declined to become officially identified with many outside enterprises. He has made an exception in the case of the First National Bank of Philadelphia, of which he has been a director for years.

Mr. McCall served as president of the Association of Edison Illuminating Companies from 1904 to 1907, and has been vice-president of the National Electric Light Association. He has also been Chairman of the N. E. L. A. Finance Committee and an active member of the Public Policy Committee. He is a member of the American Institute of Electrical Engineers and of the Franklin Institute.

His clubs include the Country, Raquet, Merion Cricket and Associates of Philadelphia, and he is a member and vice-president of the Union League of Philadelphia.

Mr. McCall was married September 30, 1889, to Lenore Adah Guest, and his family consists of two sons and one daughter.

INDEX TO EXHIBITORS

American District Steam Co
American Ironing Machine Co
Barnes & Kobert Manufacturing Co
Bell Electric Motor Co
James G Biddle
Carbolineum Wood Preserving Co
Central Station
Century Electric Co
Copeman Electric Stove Co
George Cutter Co
Delta-Star Electric Co
Harvey Deschere & Co
Edison Lamp Works of General Electric Co
Edison Storage Battery Co
Electrical Review Publishing Co
Electric Service Supplies Co
Electric Storage Battery Co
Electrical World
Federal Sign System (Electric)
G & W Electric Specialty Co
General Electric Co
General Vehicle Co
Hubbard & Co
Hughes Electric Heating Co
Hurley Machine Co
H W Johns-Manville Co
Lombard Governor Co
W N Matthews & Brother
Metropolitan Engineering Co
National Lamp Works of General Electric Co
Naugle Pole & Tie Co
Ohio Brass Co
Otis Elevator Co
Philadelphia Electric Co
Philadelphia Electrical & Manufacturing Co
Philadelphia Storage Battery Co
Pittsburgh Transformer Co
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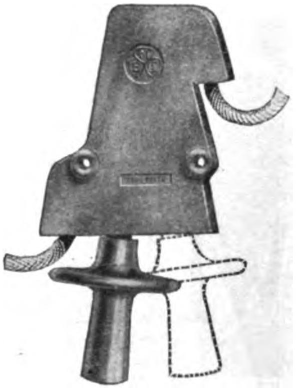

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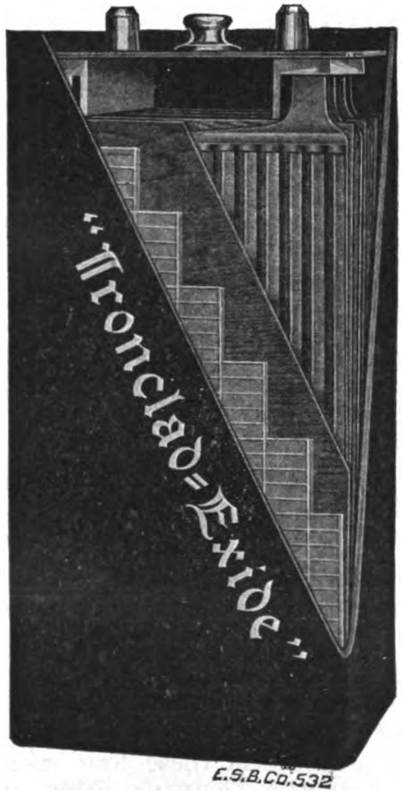

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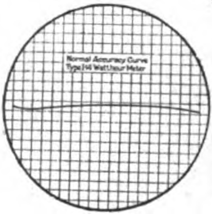

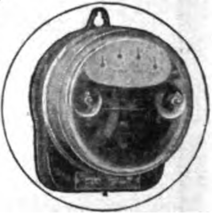

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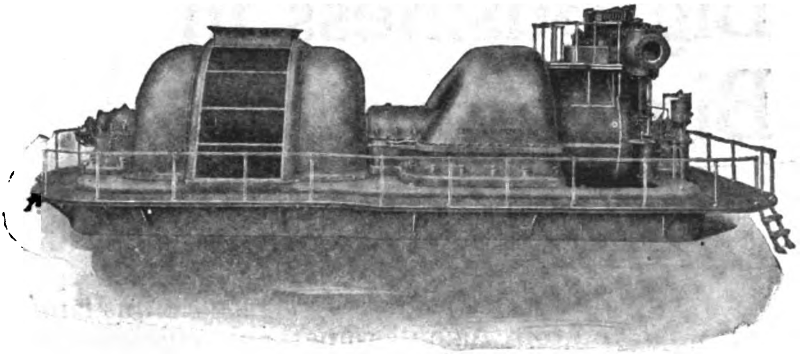

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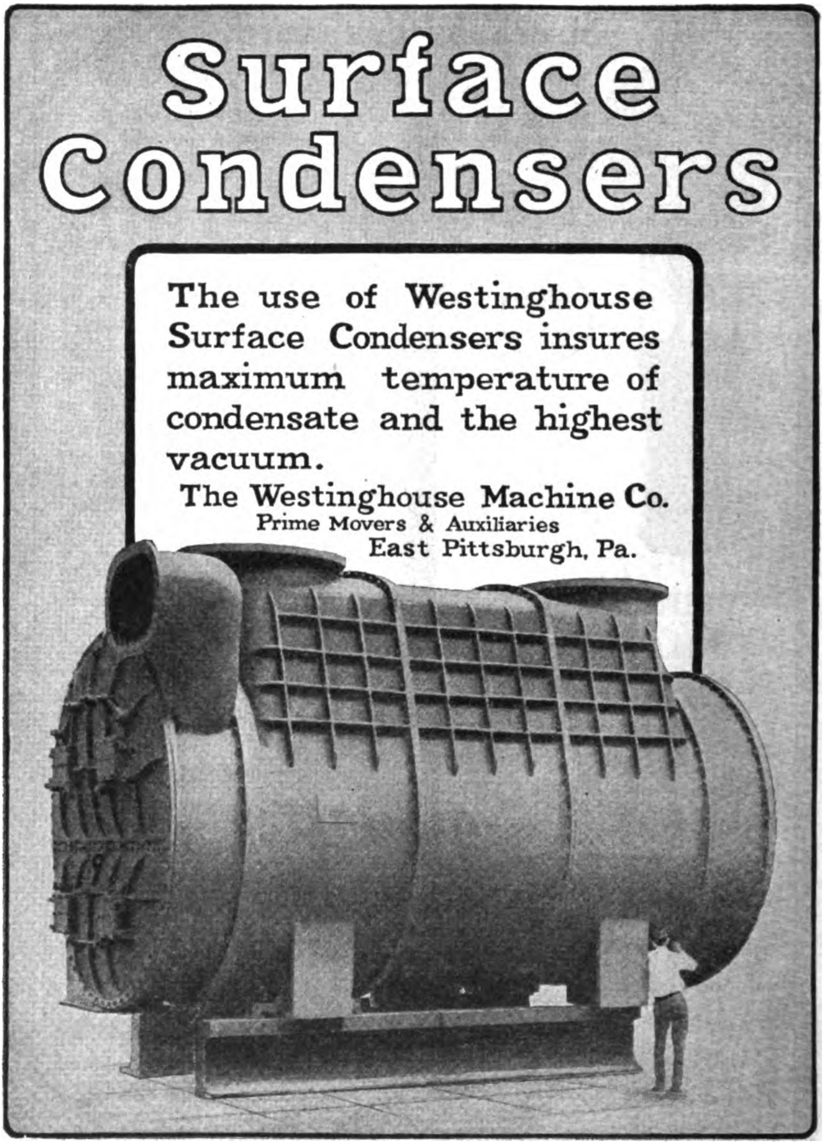

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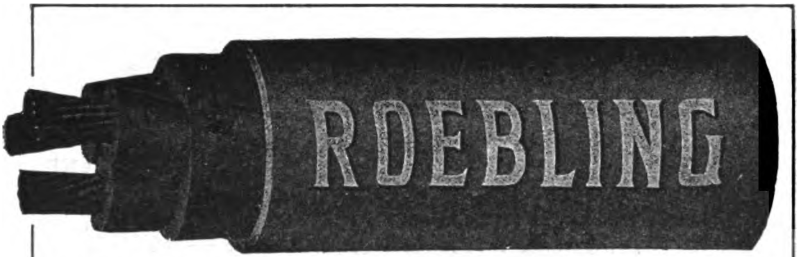

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